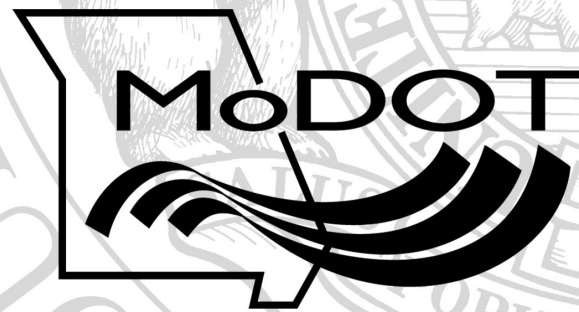


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# 2025 Missouri Standard Plans for Highway Construction

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## Missouri Department of Transportation



This set of standard plans has been approved by the Missouri Highways and Transportation Commission for highway construction projects and constitutes a contract document in accordance with Section 101.2 of the Standard Specifications for Highway Construction.

This set of Standard Plans is effective beginning with the January 2026 bid opening.

[www.modot.org/business/standards\\_and\\_specs/standardplans.htm](http://www.modot.org/business/standards_and_specs/standardplans.htm)

## EFFECTIVE: 01/01/2026

[illegible]

SHEET 1 OF 2

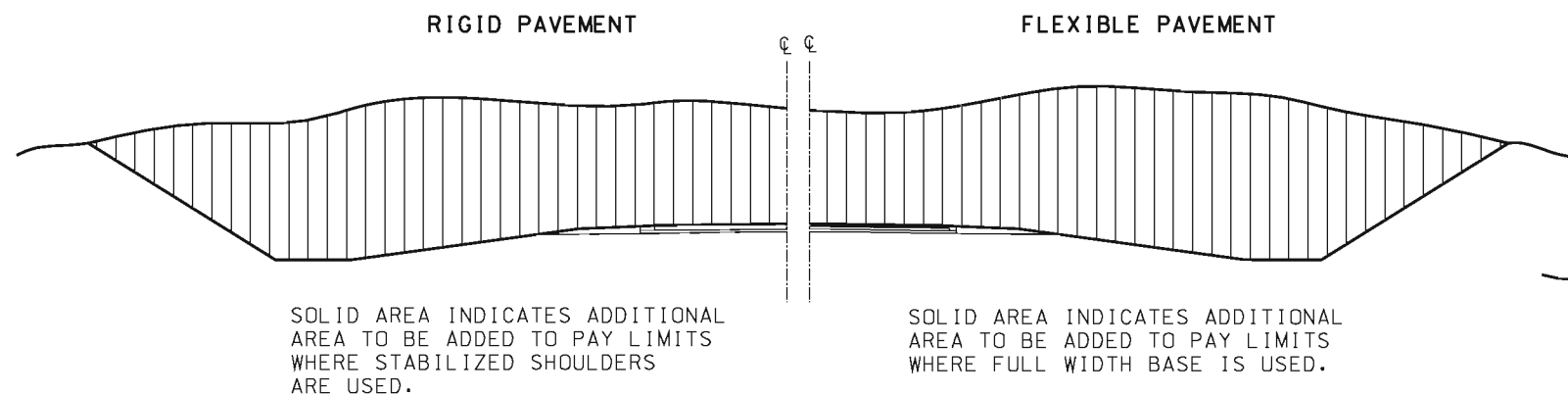
This document is not compliant with Section 508 of the Rehabilitation Act of 1973. To request this content in an accessible format, please contact the Engineering Policy Services (EPS) Group by email: [Engineering.Policy@modot.mo.gov](mailto:Engineering.Policy@modot.mo.gov).



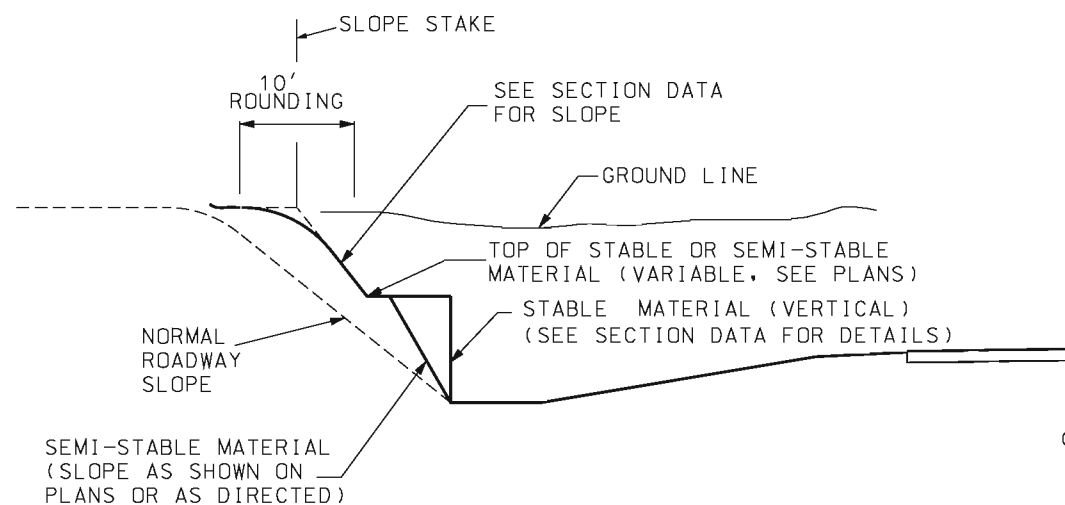
## EFFECTIVE: 01/01/2026

| STANDARD NO. | DRAWING TITLE                                                | NO. OF SHEETS | EFFECTIVE DATE |
|--------------|--------------------------------------------------------------|---------------|----------------|
| 703.10J      | CONCRETE SINGLE BOX CULVERT – STRAIGHT WINGS (SQUARED)       | 3             | 01/01/2021     |
| 703.11J      | CONCRETE SINGLE BOX CULVERT – FLARED WINGS (SQUARED)         | 3             | 01/01/2021     |
| 703.12J      | CONCRETE SINGLE BOX CULVERT – STRAIGHT WINGS (LEFT ADVANCE)  | 3             | 01/01/2021     |
| 703.13J      | CONCRETE SINGLE BOX CULVERT – FLARED WINGS (LEFT ADVANCE)    | 3             | 01/01/2021     |
| 703.14J      | CONCRETE SINGLE BOX CULVERT – STRAIGHT WINGS (RIGHT ADVANCE) | 3             | 01/01/2021     |
| 703.15E      | CONCRETE SINGLE BOX CULVERT – FLARED WINGS (RIGHT ADVANCE)   | 3             | 01/01/2021     |
| 703.16       | CONCRETE SINGLE BOX CULVERT – CUT SECTIONS                   | 1             | 01/01/2021     |
| 703.17A      | CONCRETE SINGLE BOX CULVERT – MEMBER SIZES AND REINFORCEMENT | 14            | 07/01/2023     |
| 703.37C      | CONCRETE BOX CULVERT – EXTERIOR WING REINFORCEMENT           | 2             | 04/01/2011     |
| 703.38A      | CONCRETE BOX CULVERT – CUTTING DETAILS                       | 2             | 10/01/2009     |
| 703.40H      | CONCRETE DOUBLE BOX CULVERT – STRAIGHT WINGS (SQUARED)       | 3             | 01/01/2021     |
| 703.41H      | CONCRETE DOUBLE BOX CULVERT – FLARED WINGS (SQUARED)         | 3             | 01/01/2021     |
| 703.42H      | CONCRETE DOUBLE BOX CULVERT – STRAIGHT WINGS (LEFT ADVANCE)  | 3             | 01/01/2021     |
| 703.43H      | CONCRETE DOUBLE BOX CULVERT – FLARED WINGS (LEFT ADVANCE)    | 3             | 01/01/2021     |
| 703.44H      | CONCRETE DOUBLE BOX CULVERT – STRAIGHT WINGS (RIGHT ADVANCE) | 3             | 01/01/2021     |
| 703.45C      | CONCRETE DOUBLE BOX CULVERT – FLARED WINGS (RIGHT ADVANCE)   | 3             | 01/01/2021     |
| 703.46       | CONCRETE DOUBLE BOX CULVERT – CUT SECTION                    | 1             | 01/01/2021     |
| 703.47A      | CONCRETE DOUBLE BOX CULVERT – MEMBER SIZES AND REINFORCEMENT | 27            | 07/01/2023     |
| 703.60E      | CONCRETE BOX STRUCTURE – PIPE INLET                          | 1             | 07/01/2001     |
| 703.80H      | CONCRETE TRIPLE BOX CULVERT – STRAIGHT WINGS (SQUARED)       | 3             | 01/01/2021     |
| 703.81H      | CONCRETE TRIPLE BOX CULVERT – FLARED WINGS (SQUARED)         | 3             | 01/01/2021     |
| 703.82H      | CONCRETE TRIPLE BOX CULVERT – STRAIGHT WINGS (LEFT ADVANCE)  | 3             | 01/01/2021     |
| 703.83H      | CONCRETE TRIPLE BOX CULVERT – FLARED WINGS (LEFT ADVANCE)    | 3             | 01/01/2021     |
| 703.84H      | CONCRETE TRIPLE BOX CULVERT – STRAIGHT WINGS (RIGHT ADVANCE) | 3             | 01/01/2021     |
| 703.85C      | CONCRETE TRIPLE BOX CULVERT – FLARED WINGS (RIGHT ADVANCE)   | 3             | 01/01/2021     |
| 703.86       | CONCRETE TRIPLE BOX CULVERT – CUT SECTIONS                   | 1             | 01/01/2021     |
| 703.87A      | CONCRETE TRIPLE BOX CULVERT – MEMBER SIZES AND REINFORCEMENT | 27            | 07/01/2023     |
| 706.35H      | BAR SUPPORTS FOR CONCRETE REINFORCEMENT                      | 1             | 07/01/2004     |
| 712.40L      | STEEL DAMS AT EXPANSION JOINTS                               | 1             | 10/01/2019     |
| 725.00C      | CORRUGATED METAL PIPE INSTALLATION METHODS                   | 5             | 04/01/2011     |
| 725.31C      | METAL CURTAIN WALL AND METAL INLETS                          | 1             | 07/01/2004     |
| 726.30J      | RIGID CULVERT INSTALLATION METHODS                           | 2             | 04/01/2015     |
| 730.00E      | THERMOPLASTIC PIPE INSTALLATION METHODS                      | 1             | 04/01/2015     |
| 731.00U      | PRECAST MANHOLES                                             | 2             | 07/01/2016     |
| 731.10T      | PRECAST DROP INLET                                           | 8             | 01/01/2025     |
| 732.00S      | FLARED END SECTION                                           | 3             | 07/01/2021     |
| 732.05D      | BEVELED PIPE END TREATMENT                                   | 2             | 01/01/2021     |
| 732.10H      | SAFETY SLOPE END SECTION                                     | 3             | 01/01/2021     |
| 733.00       | PRECAST CONCRETE BOX CULVERT TIES                            | 1             | 07/01/2021     |
| 805.00A      | SEEDING                                                      | 1             | 04/01/2024     |
| 806.10K      | TEMPORARY EROSION CONTROL MEASURES                           | 6             | 01/01/2023     |
| 808.00       | TYPICAL PLANTING ILLUSTRATIONS                               | 3             | 07/01/2004     |
|              |                                                              |               |                |
|              |                                                              |               |                |
|              |                                                              |               |                |

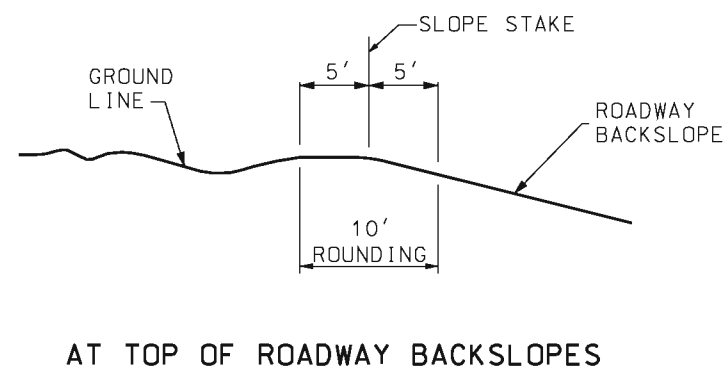
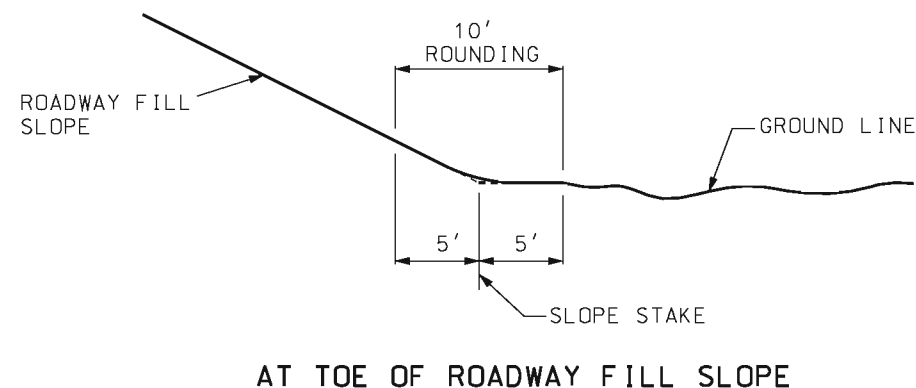
[illegible]



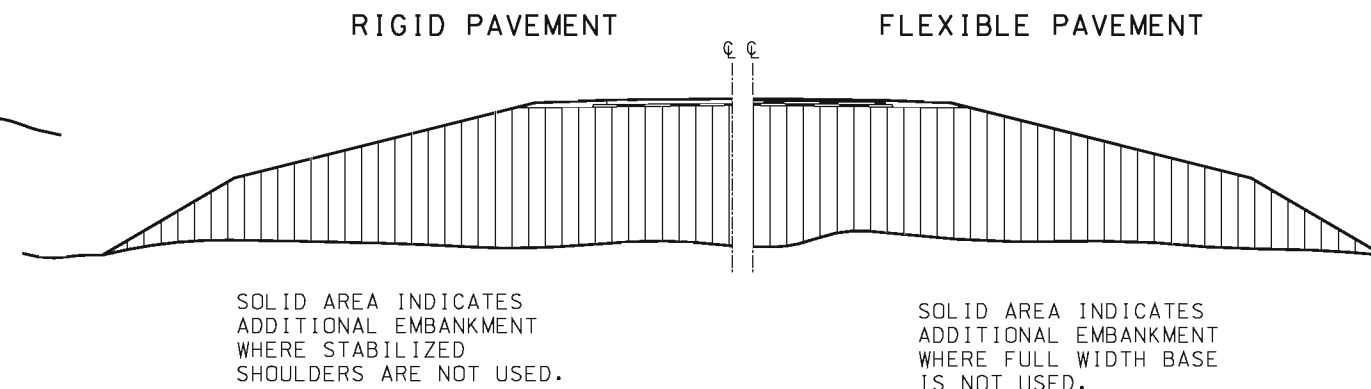
### EXCAVATION PAY LIMITS



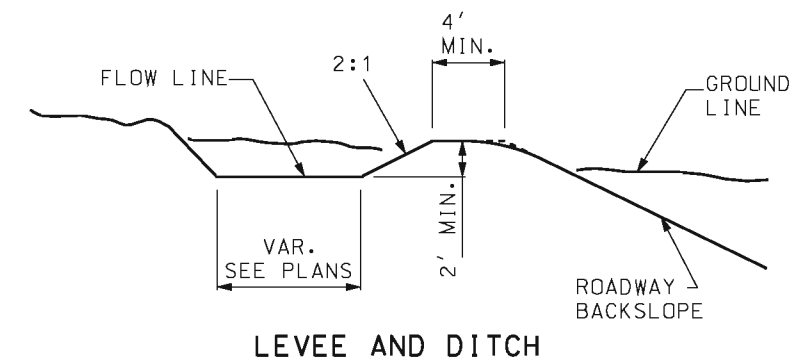
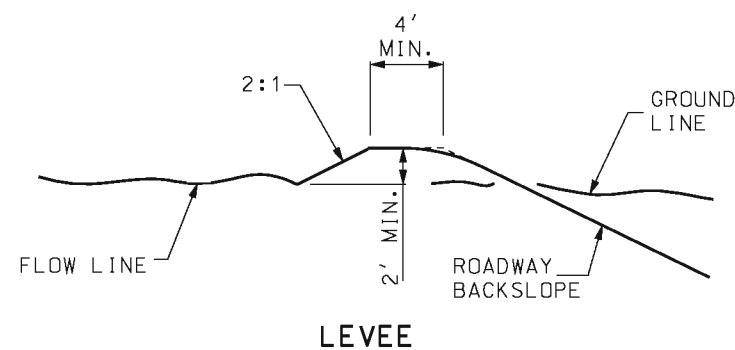
### BACKSLOPES IN STABLE AND SEMI-STABLE MATERIAL



### PARABOLIC ROUNDING



### EMBANKMENT LIMITS



### INTERCEPTION DITCH AND/OR LEVEE

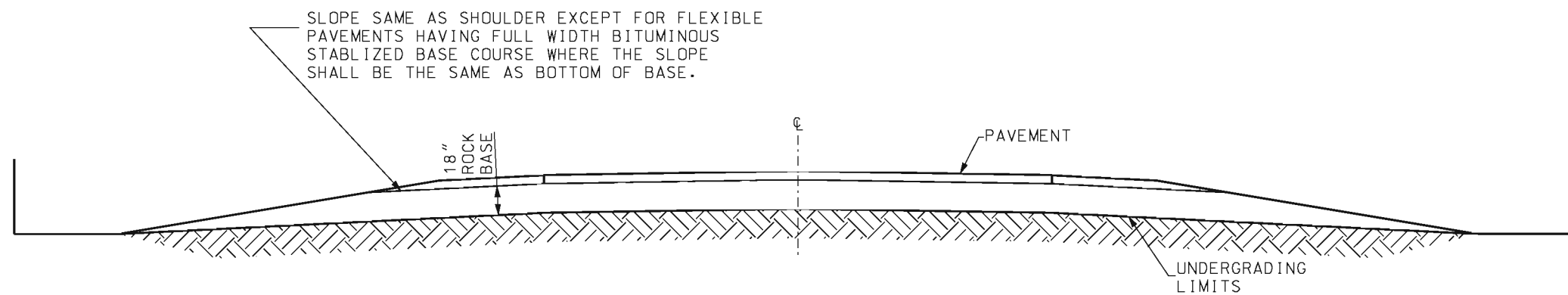
LEVEE AND/OR DITCH MAY BE LOCATED BACK OF BACKSLOPE WHEN CONDITIONS REQUIRE. USE DITCH ONLY WHERE INDICATED OR WHERE REQUIRED FOR DRAINAGE.

#### GENERAL NOTES:

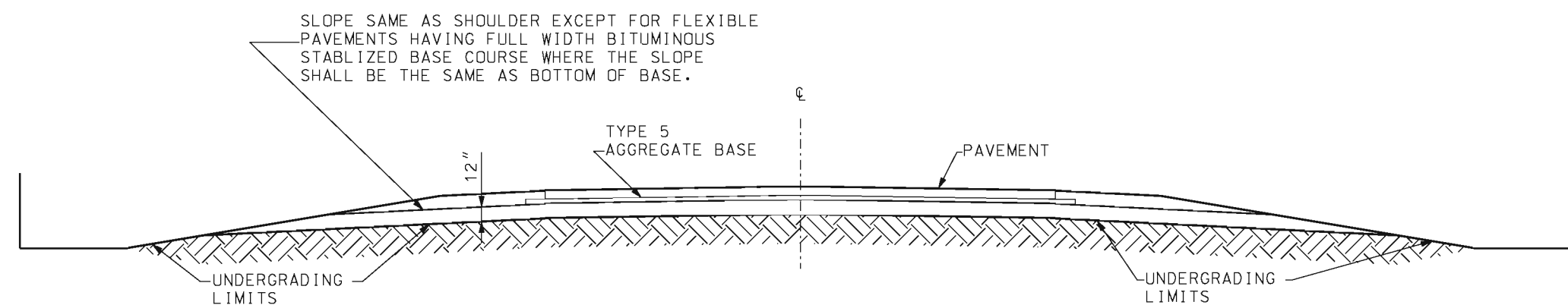
SUBSURFACE LOGS OF MATERIALS OBTAINED DURING THE SOIL SURVEY FOR THE PURPOSE OF CUT CLASSIFICATION MAY BE ACQUIRED FROM THE DISTRICT OFFICE UPON REQUEST.

|                                                                                                                                                                                 |                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                         |                                                                       |
| <p>STATE OF MISSOURI</p> <p>KATHRYN PHILLIPS HARVEY</p> <p>NUMBER PE-23751</p> <p>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>EXCAVATION AND EMBANKMENT</b></p> <p><b>TYPICAL DETAILS</b></p> |
| <p>DATE EFFECTIVE: 08/01/1998</p> <p>DATE PREPARED: 8/21/2009</p>                                                                                                               | <p><b>203.00E</b></p>                                                 |
| <p>SHEET NO. 1 OF 1</p>                                                                                                                                                         |                                                                       |

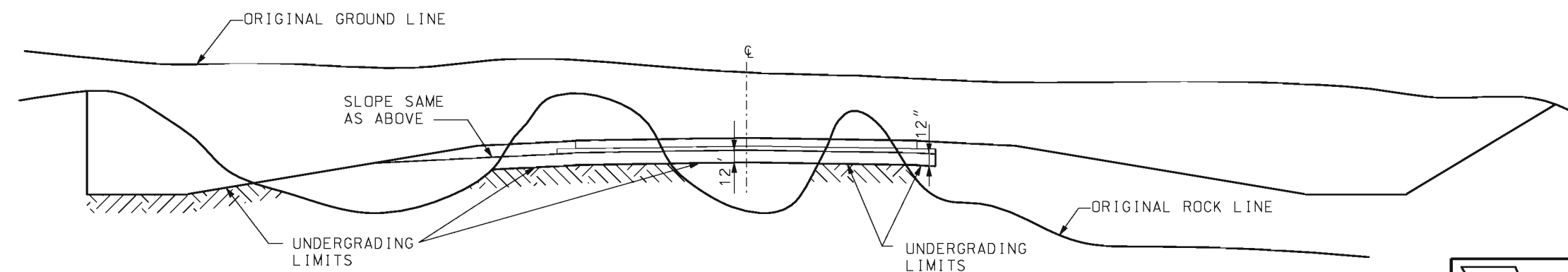
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



**IN ROCK OVER ENTIRE WIDTH OF ROADBED WITH 18" ROCK BASE**



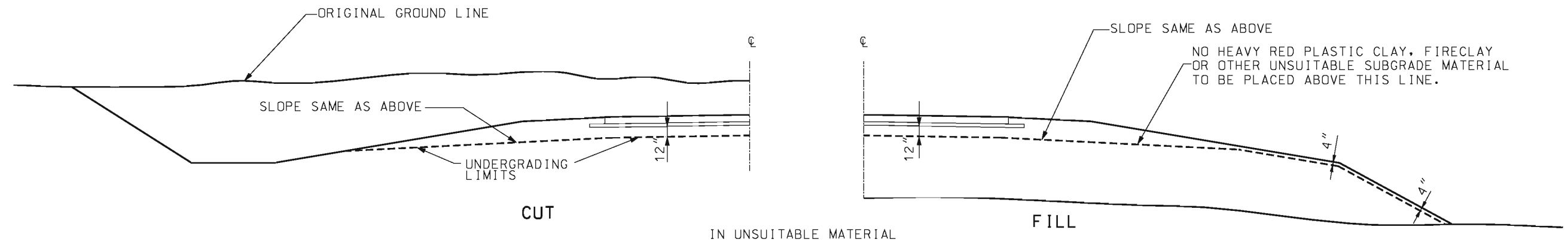
**IN ROCK OVER ENTIRE WIDTH OF ROADBED WITH TYPE 5 AGGREGATE BASE**



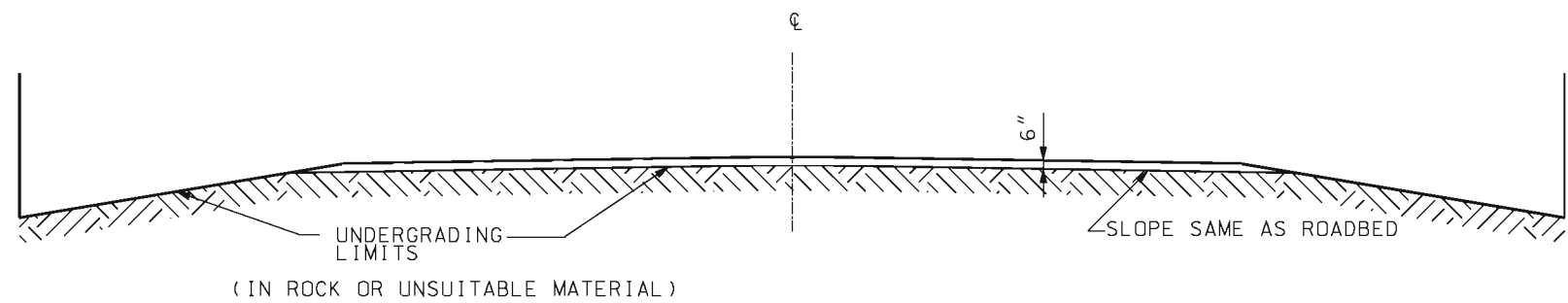
**IN ROCK OVER PARTIAL WIDTH OF ROADBED**

|                                                                                                                                                                                                                                  |                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                |
|                                                                                                                                             | <p><b>UNDERGRADING</b><br/>TYPICAL DETAILS</p> |
| DATE EFFECTIVE: 01/01/2004<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <p><b>203.02F</b></p>                          |
| SHEET NO.<br>1 OF 2                                                                                                                                                                                                              |                                                |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



**UNDERGRADING LIMITS**  
(FLEXIBLE OR RIGID PAVEMENTS)



**UNDERGRADING LIMITS**  
(EARTH OR AGGREGATE TYPE SURFACE)

GENERAL NOTES:

|                                                                                                                                                                                                                                  |                                        |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                        |                     |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <b>UNDERGRADING</b><br>TYPICAL DETAILS |                     |
| DATE EFFECTIVE: 01/01/2004<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <b>203.02F</b>                         | SHEET NO.<br>2 OF 2 |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



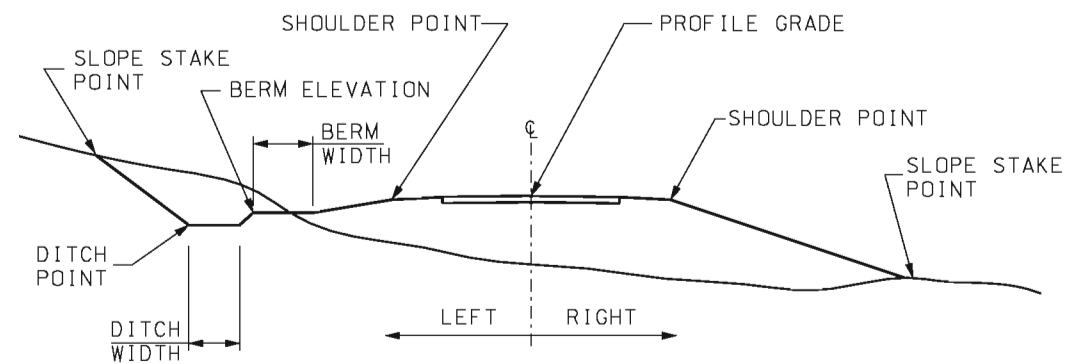


FIGURE A

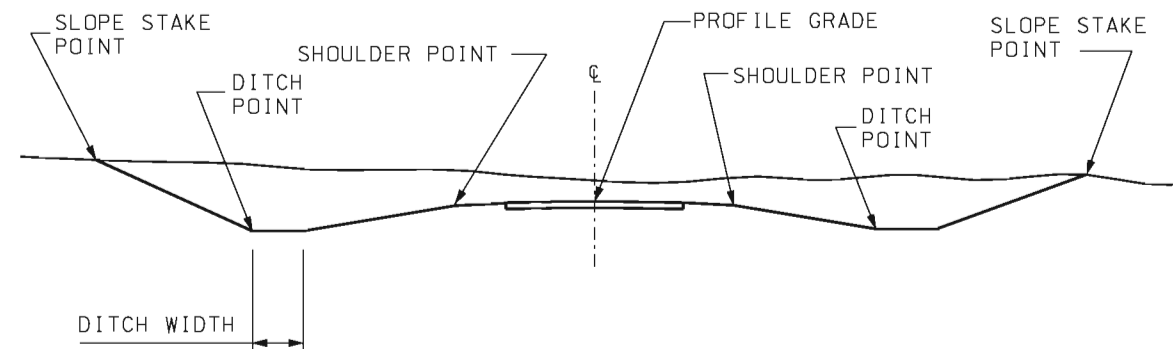


FIGURE B

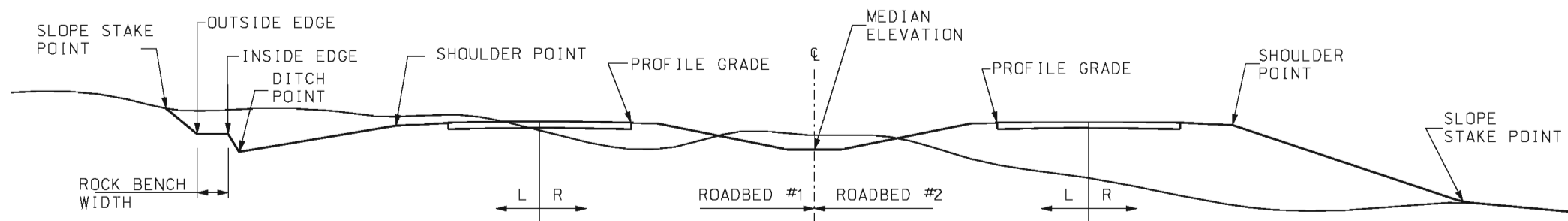


FIGURE C

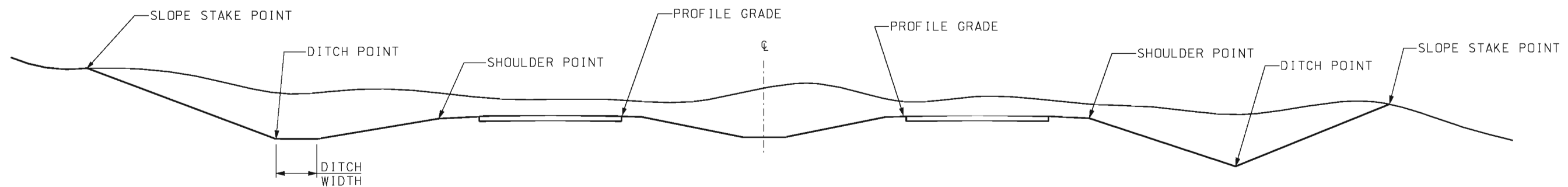


FIGURE D

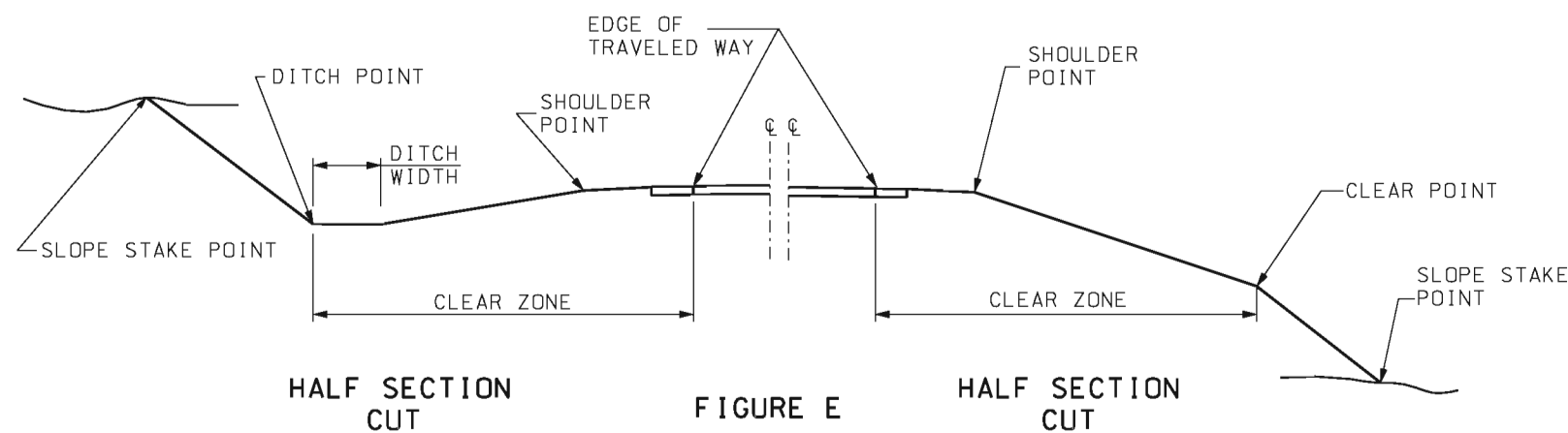
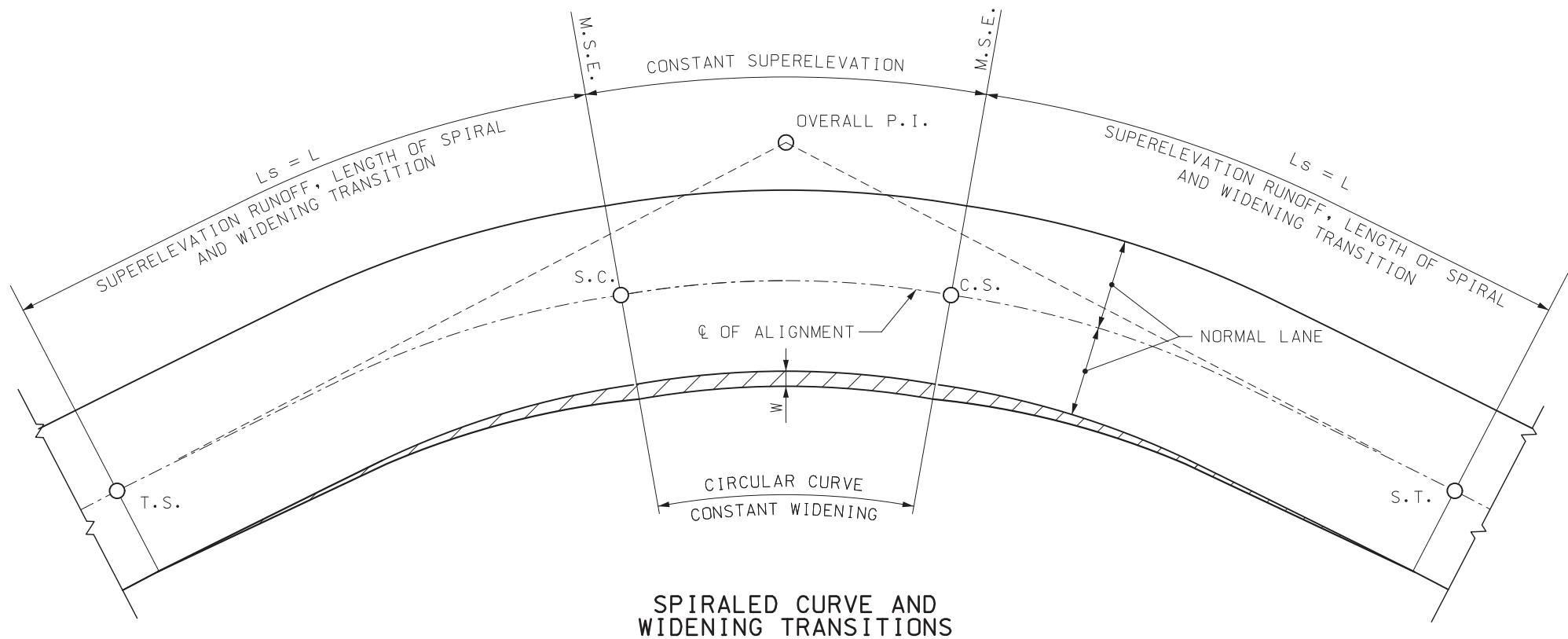


FIGURE E

|                                                                                                                                                                                                                                  |                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                             |
|                                                                                                                                             | <b>TABULATED EARTHWORK AND SECTION DATA</b> |
| DATE EFFECTIVE: 02/01/2009<br>DATE PREPARED: 12/18/2008                                                                                                                                                                          | <b>203.10D</b>                              |
| SHEET NO. 1 OF 1                                                                                                                                                                                                                 |                                             |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



SPIRALED CURVE AND  
WIDENING TRANSITIONS

| MULTILANE FACTORS<br>FOR "L" |                                 |
|------------------------------|---------------------------------|
| 1.0 LANE                     | ROTATED (2 LANE ROADBED) = 1.00 |
| 1.5 LANE                     | ROTATED (3 LANE ROADBED) = 1.25 |
| 2.0 LANE                     | ROTATED (4 LANE ROADBED) = 1.50 |
| 2.5 LANE                     | ROTATED (5 LANE ROADBED) = 1.75 |
| 3.0 LANE                     | ROTATED (6 LANE ROADBED) = 2.00 |
| 3.5 LANE                     | ROTATED (7 LANE ROADBED) = 2.25 |

| MAXIMUM RADIUS FOR USE OF A<br>SPIRAL CURVE TRANSITION |                     |
|--------------------------------------------------------|---------------------|
| DESIGN SPEED                                           | MAXIMUM RADIUS (FT) |
| 30                                                     | 456                 |
| 35                                                     | 620                 |
| 40                                                     | 810                 |
| 45                                                     | 1025                |
| 50                                                     | 1265                |
| 55                                                     | 1531                |
| 60                                                     | 1822                |
| 65                                                     | 2138                |
| 70                                                     | 2479                |

TABLE NOTE: THE EFFECT OF SPIRAL CURVE TRANSITION ON LATERAL ACCELERATION IS LIKELY TO BE NEGLIGIBLE FOR LARGER RADII.

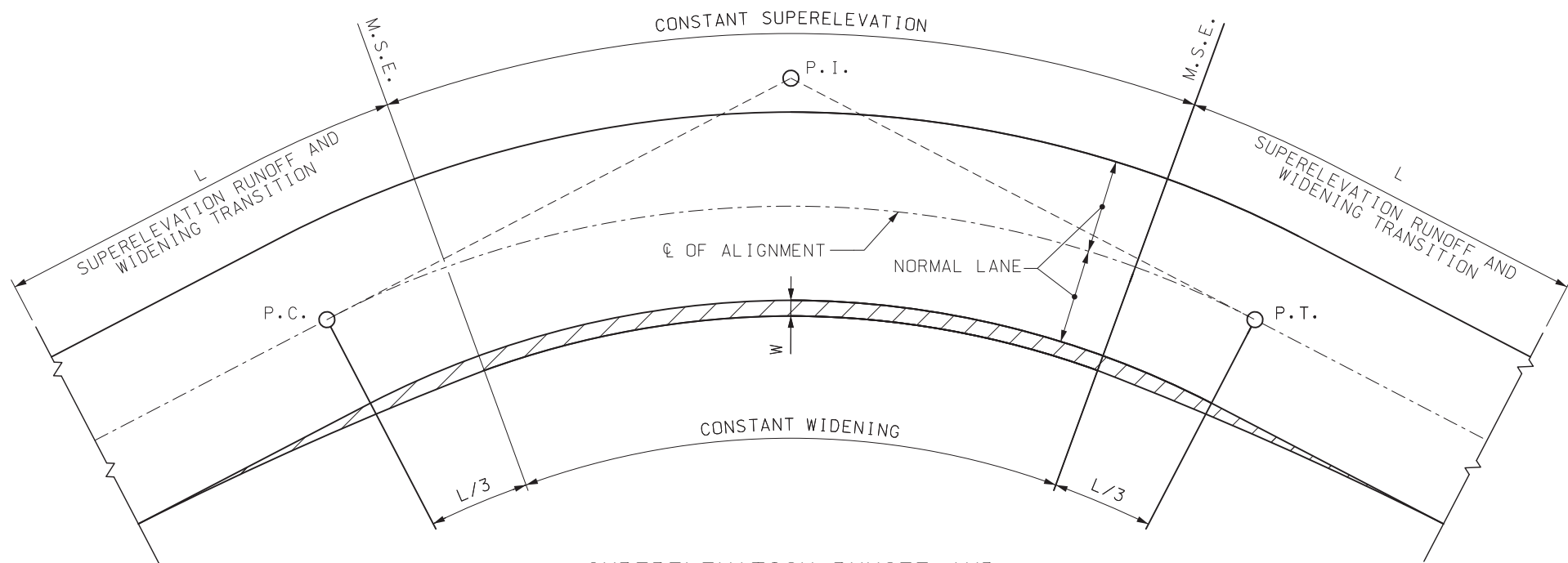
GENERAL NOTES:

A PRACTICAL CONTROL FOR THE LENGTH OF SPIRAL "Ls" IS CONSIDERED TO BE THE SUPERELEVATION RUNOFF "L", SEE STANDARD PLANS 203.22 SHEET 1 OF 2.

"W" THE WIDENING FOR SURFACING AT INSIDE SHOULDERS, SEE STANDARD PLANS 203.22 SHEET 2 OF 2.

WIDENING TRANSITION VARIES IN DIRECT PROPORTION TO DISTANCE.

SPIRAL CURVES ARE USED ON ALL ROADWAYS THAT HAVE DESIGN TRAFFIC GREATER THAN 400 VEHICLES PER DAY, AND HAVE A RADIUS LESS THAN THE VALUES LISTED IN THE "MAXIMUM RADIUS FOR USE OF A SPIRAL CURVE TRANSITION" TABLE.



SUPERELEVATION RUNOFF AND  
WIDENING TRANSITIONS  
WITHOUT SPIRALS

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

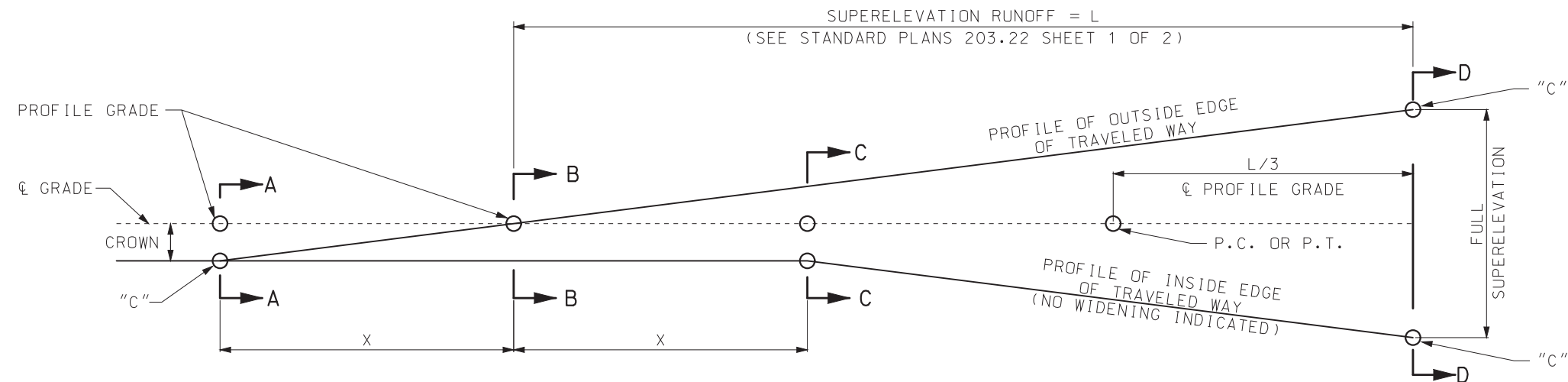
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**SUPERELEVATION  
SPIRALS AND WIDENING  
UNDIVIDED HIGHWAYS**

DATE EFFECTIVE: 07/01/2017  
DATE PREPARED: 1/16/2024

**203.20G**

SHEET NO.  
**1 OF 4**

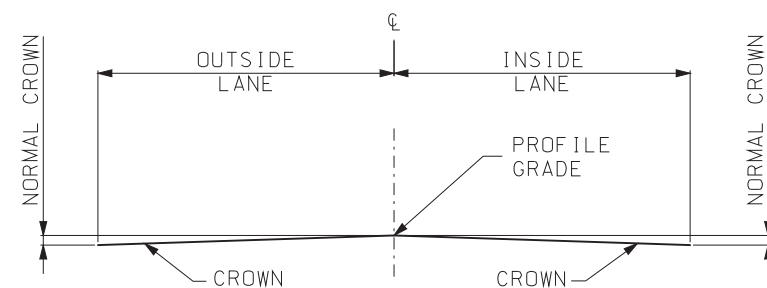


A-A TO B-B IS THE TANGENT RUNOUT.

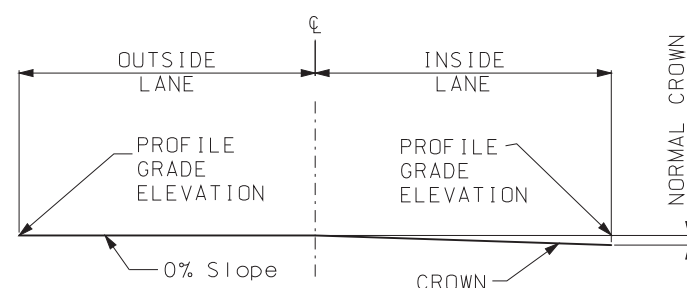
$$X = \frac{L \times NC(\%)}{e(\%)}$$

NOTE:

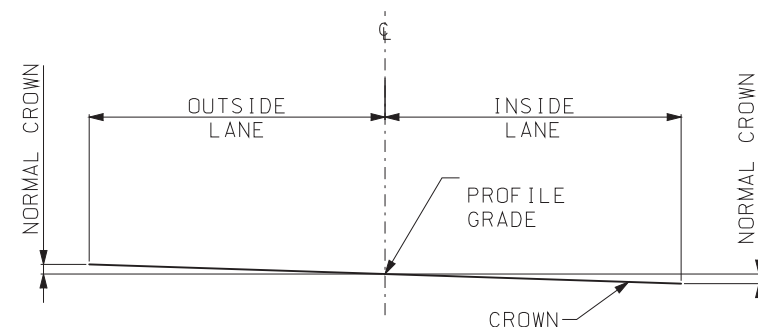
SHORT VERTICAL CURVES MAY BE INSERTED AT POINTS "C" BY EYE ADJUSTMENTS OF STAKES OR FORMS IN THE FIELD.



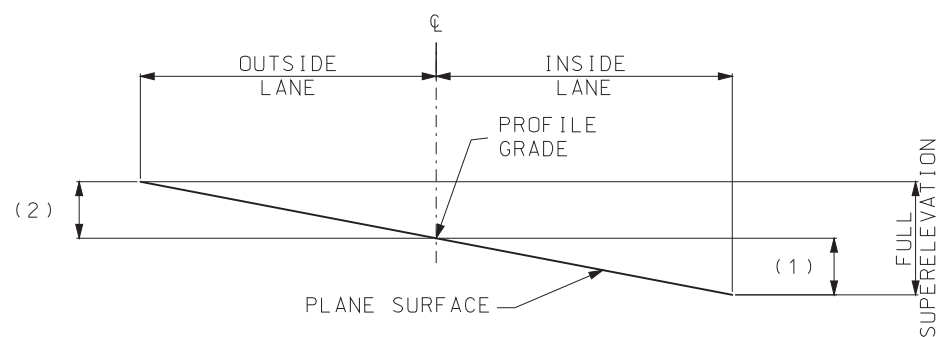
SECTION A-A



SECTION B-B



SECTION C-C



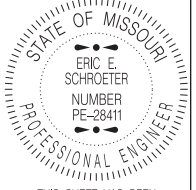
(1) FULL S.E. FOR  $\frac{1}{2}$  PAVEMENT WIDTH IF GREATER THAN CROWN SLOPE.

(2) FULL S.E. FOR  $\frac{1}{2}$  PAVEMENT WIDTH.

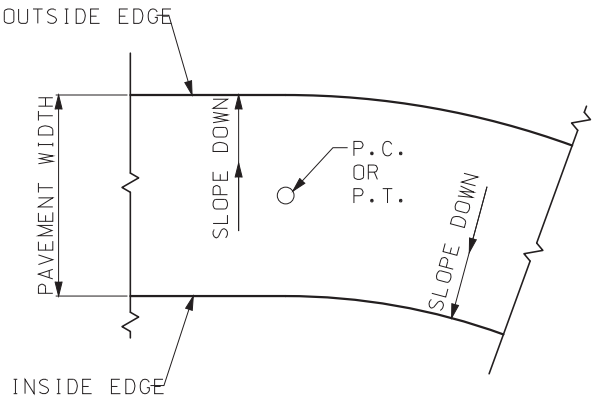
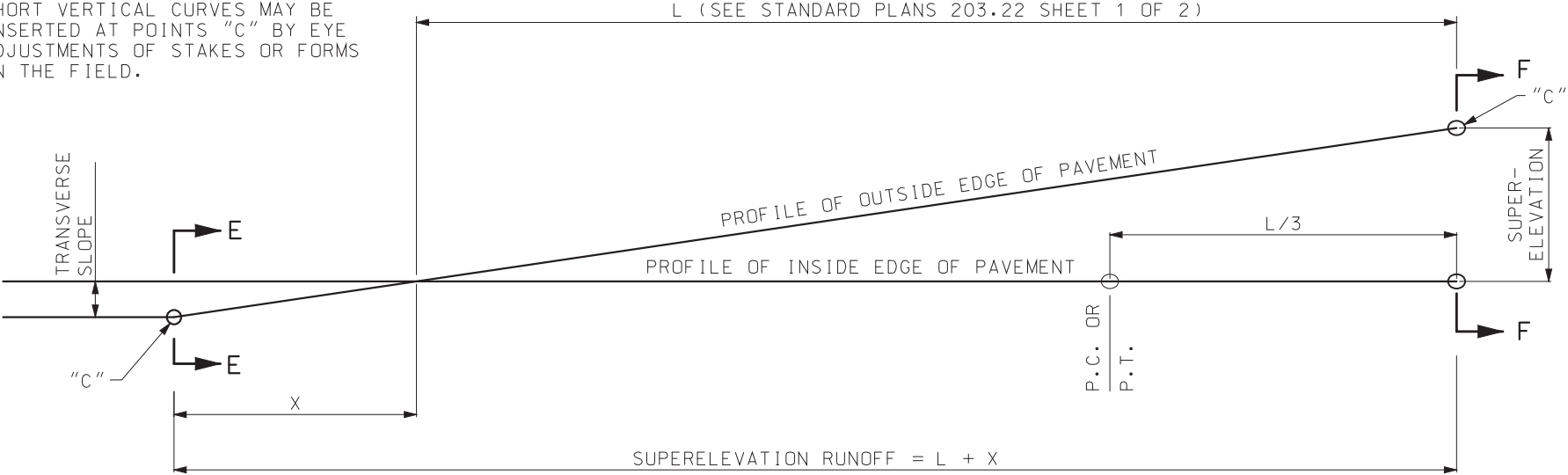
SECTION D-D

### CASE NUMBER 1

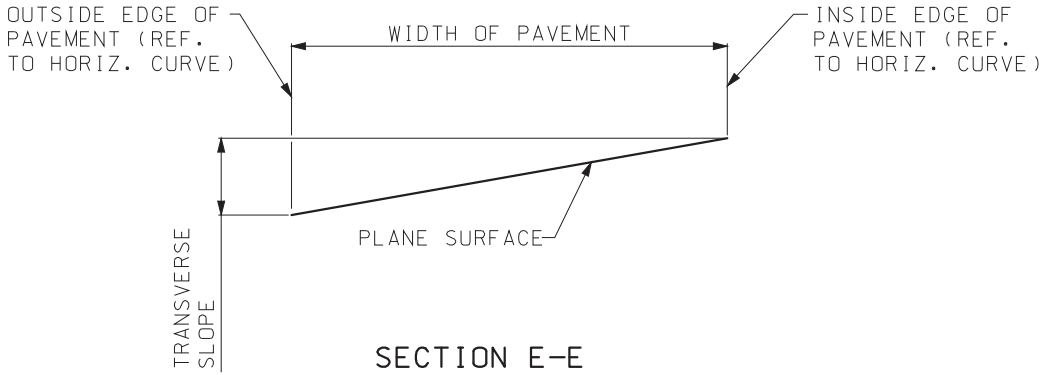
(WHERE HIGH POINT OF TRAVELED WAY IS AT CENTERLINE ON TANGENT SECTION)  
NOTE: USE FOR 2 LANE TRAFFIC ROADS ONLY. PAVEMENT REVOLVED ABOUT ITS ℄.

|                                                                                                                                              |                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                                               |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                                               |
|                                                         | <b>SUPERELEVATION SPIRALS AND WIDENING UNDIVIDED HIGHWAYS</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                        | <b>203.20G</b>                                                |
| SHEET NO.<br><b>2 OF 4</b>                                                                                                                   |                                                               |

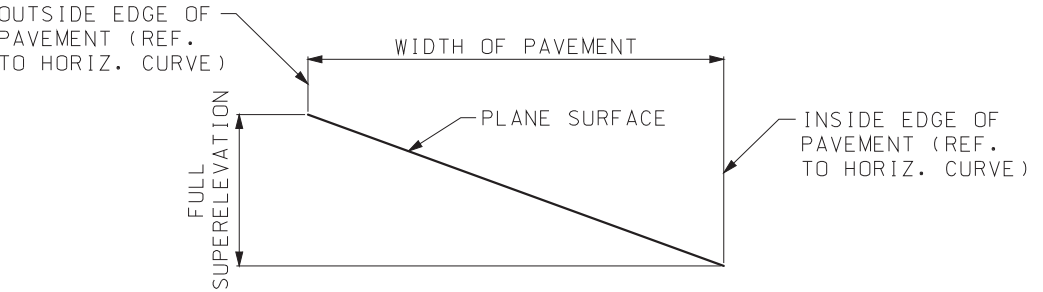
NOTE:  
SHORT VERTICAL CURVES MAY BE  
INSERTED AT POINTS "C" BY EYE  
ADJUSTMENTS OF STAKES OR FORMS  
IN THE FIELD.



PLAN OF ALIGNMENT  
FOR CASE NUMBER 2



SECTION E-E

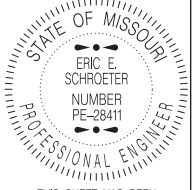


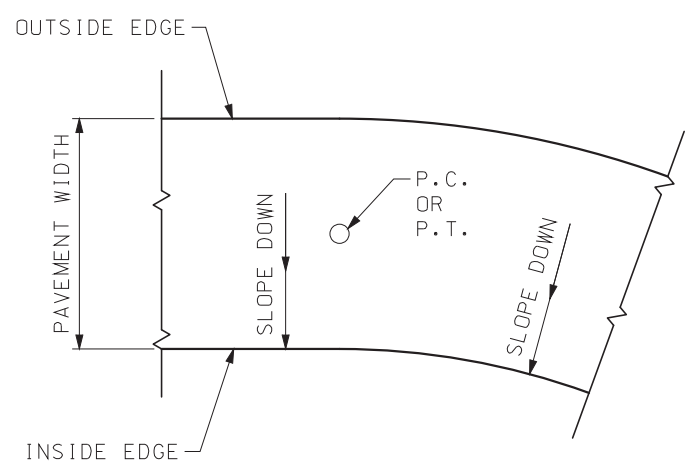
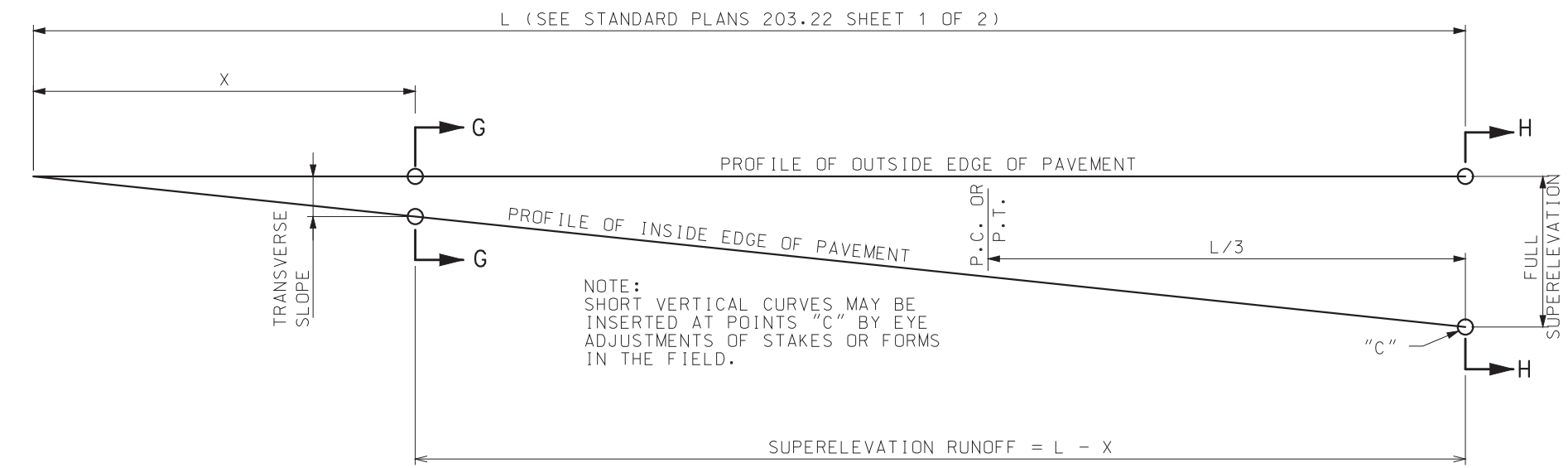
SECTION F-F

CASE NUMBER 2

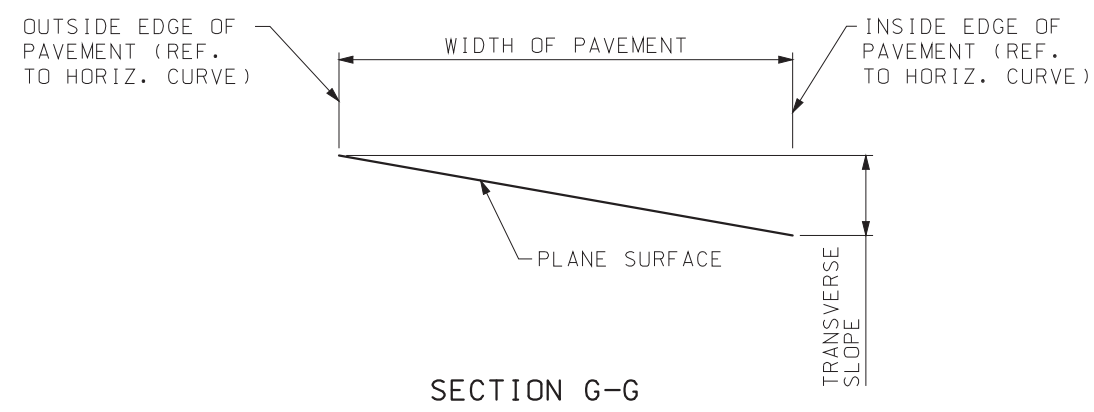
(WHERE TRANSVERSE SLOPE ON TANGENT SECTION IS OPPOSITE TO SLOPE OF SUPERELEVATION)  
NOTE: PAVEMENT REVOLVED ABOUT ITS INSIDE EDGE WITH REFERENCE TO THE HORIZONTAL CURVE WHICH IS BEING APPROACHED.

STRAIGHT LINE METHODS OF ATTAINING SUPERELEVATION

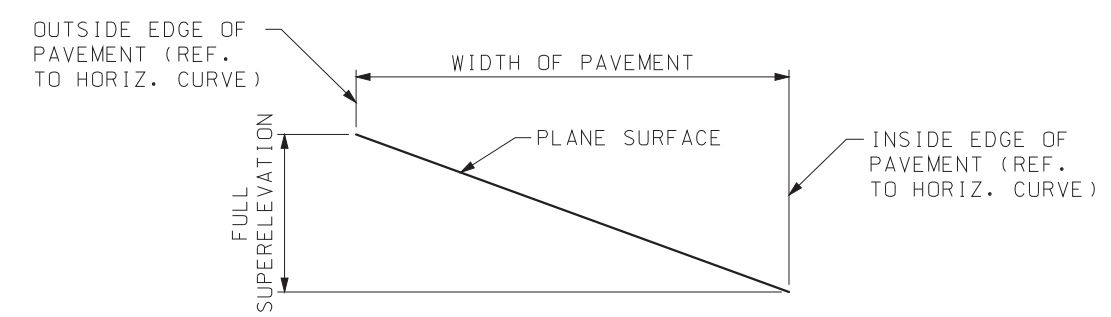
|                                                                                                                                                                                                                                  |                                                                       |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                       |         |
| <br>THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY.                                                                      | <b>SUPERELEVATION<br/>SPIRALS AND WIDENING<br/>UNDIVIDED HIGHWAYS</b> |         |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                 | 203.20G |



PLAN OF ALIGNMENT  
FOR CASE NUMBER 3



SECTION G-G

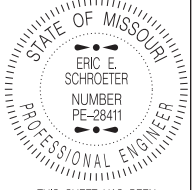


SECTION H-H

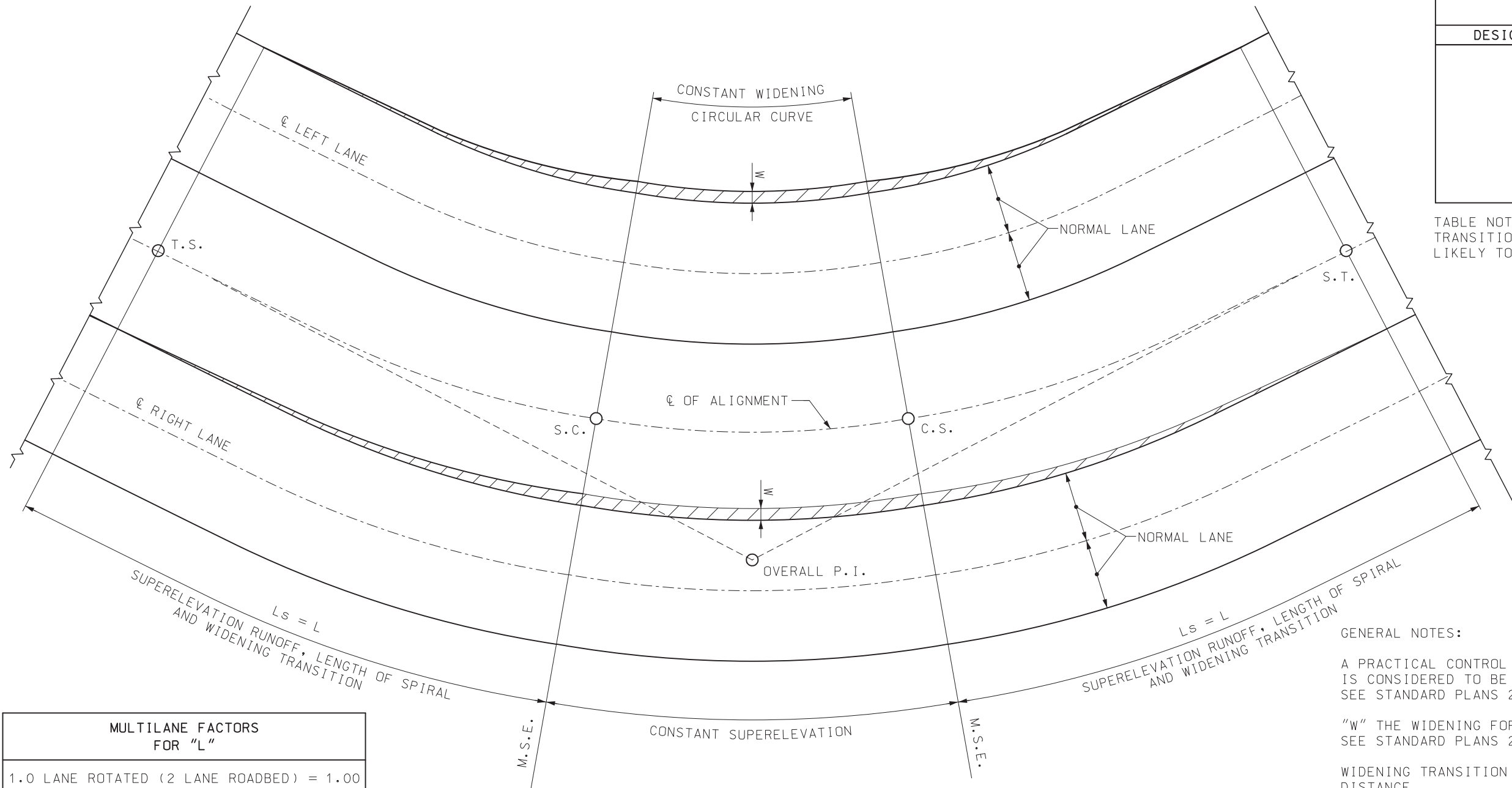
CASE NUMBER 3

(WHERE TRANSVERSE SLOPE ON TANGENT SECTION IS SAME DIRECTION AS SLOPE OF SUPERELEVATION)  
NOTE: PAVEMENT REVOLVED ABOUT ITS OUTSIDE EDGE WITH REFERENCE TO THE HORIZONTAL CURVE WHICH IS BEING APPROACHED.

STRAIGHT LINE METHOD OF ATTAINING SUPERELEVATION

|                                                                                                                                                                                                                                  |                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                             |
|                                                                                                                                             | <p align="center"><b>SUPERELEVATION<br/>SPIRALS AND WIDENING<br/>UNDIVIDED HIGHWAYS</b></p> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | 203.20G                                                                                     |
| SHEET NO.<br>4 OF 4                                                                                                                                                                                                              |                                                                                             |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



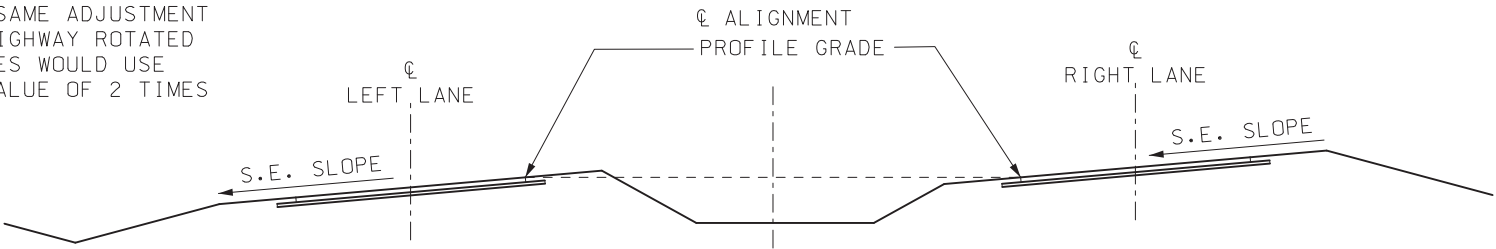
| MAXIMUM RADIUS FOR USE OF A SPIRAL CURVE TRANSITION |                     |
|-----------------------------------------------------|---------------------|
| DESIGN SPEED                                        | MAXIMUM RADIUS (FT) |
| 30                                                  | 456                 |
| 35                                                  | 620                 |
| 40                                                  | 810                 |
| 45                                                  | 1025                |
| 50                                                  | 1265                |
| 55                                                  | 1531                |
| 60                                                  | 1822                |
| 65                                                  | 2138                |
| 70                                                  | 2479                |

TABLE NOTE: THE EFFECT OF SPIRAL CURVE TRANSITION ON LATERAL ACCELERATION IS LIKELY TO BE NEGLIGIBLE FOR LARGER RADII.

| MULTILANE FACTORS FOR "L"                |
|------------------------------------------|
| 1.0 LANE ROTATED (2 LANE ROADBED) = 1.00 |
| 1.5 LANE ROTATED (3 LANE ROADBED) = 1.25 |
| 2.0 LANE ROTATED (4 LANE ROADBED) = 1.50 |
| 2.5 LANE ROTATED (5 LANE ROADBED) = 1.75 |
| 3.0 LANE ROTATED (6 LANE ROADBED) = 2.00 |
| 3.5 LANE ROTATED (7 LANE ROADBED) = 2.25 |

EXAMPLE: A SIX LANE DIVIDED HIGHWAY (3 LANES IN EACH DIRECTION) ROTATED SEPARATELY ABOUT ITS MEDIAN EDGES WOULD USE THE SAME ADJUSTMENT VALUE AS A SIX LANE UNDIVIDED HIGHWAY ROTATED ABOUT THE CENTERLINE. BOTH CASES WOULD USE THE 3 LANE ROTATED ADJUSTMENT VALUE OF 2 TIMES THE VALUE OF ONE LANE ROTATED.

### SPIRALED CURVE AND WIDENING TRANSITIONS



SECTION ON SUPERELEVATED CURVE  
CURVE TO LEFT (ILLUSTRATED)

#### GENERAL NOTES:

A PRACTICAL CONTROL FOR THE LENGTH OF SPIRAL "Ls" IS CONSIDERED TO BE THE SUPERELEVATION RUNOFF "L", SEE STANDARD PLANS 203.22 SHEET 1 OF 2.

"W" THE WIDENING FOR SURFACING AT INSIDE SHOULDER, SEE STANDARD PLANS 203.22 SHEET 2 OF 2.

WIDENING TRANSITION VARIES IN DIRECT PROPORTION TO DISTANCE.

SPIRAL CURVES ARE USED ON ALL ROADWAYS THAT HAVE DESIGN TRAFFIC GREATER THAN 400 VEHICLES PER DAY, AND HAVE A RADIUS LESS THAN THE VALUES LISTED IN THE "MAXIMUM RADIUS FOR USE OF A SPIRAL CURVE TRANSITION" TABLE.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**SUPERELEVATION, SPIRALS AND WIDENING DIVIDED HIGHWAYS**

DATE EFFECTIVE: 07/01/2017

DATE PREPARED: 1/16/2024

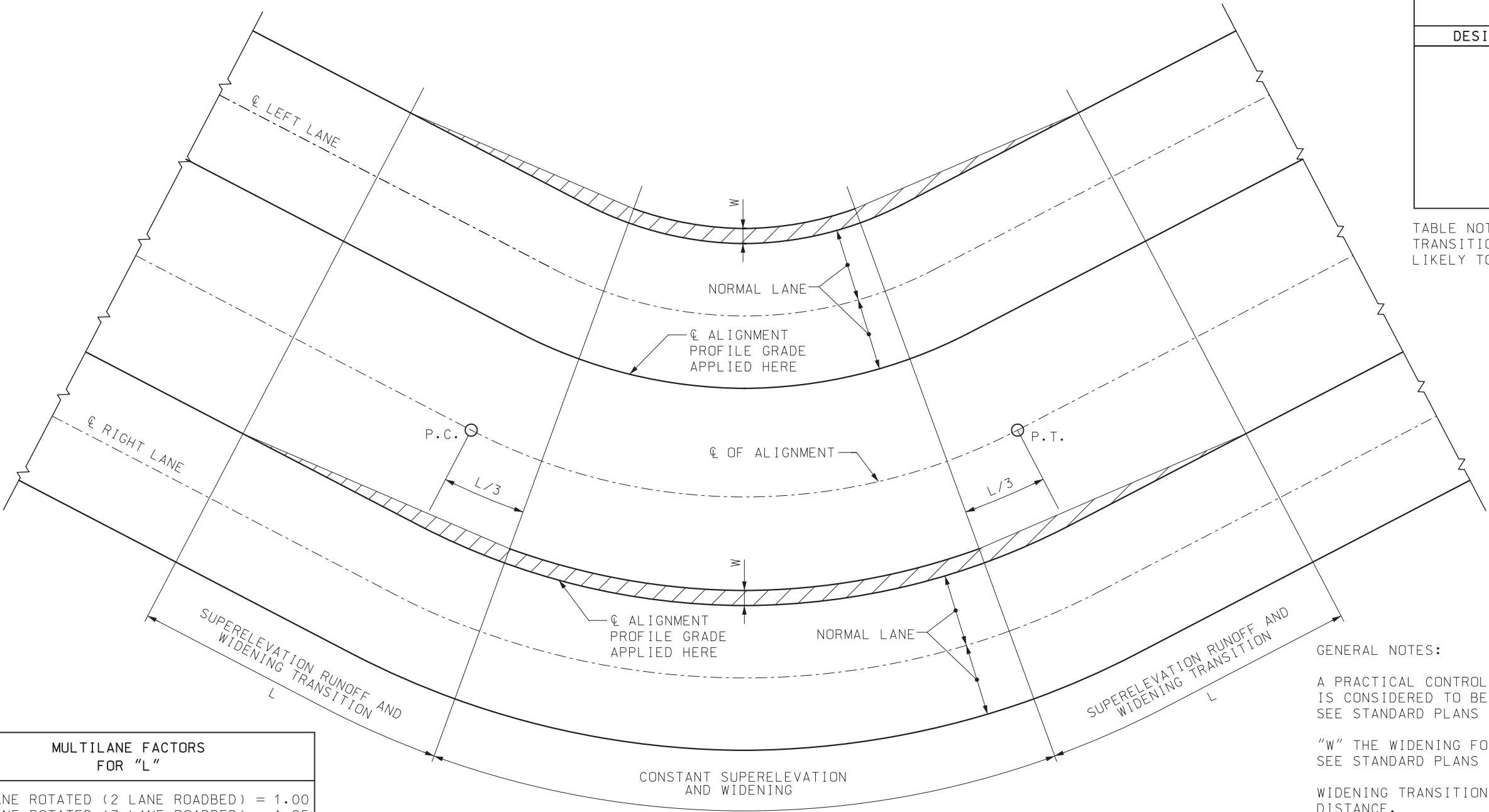
203.21K

SHEET NO.  
1 OF 3



| MAXIMUM RADIUS FOR USE OF A SPIRAL CURVE TRANSITION |                     |
|-----------------------------------------------------|---------------------|
| DESIGN SPEED                                        | MAXIMUM RADIUS (FT) |
| 30                                                  | 456                 |
| 35                                                  | 620                 |
| 40                                                  | 810                 |
| 45                                                  | 1025                |
| 50                                                  | 1265                |
| 55                                                  | 1531                |
| 60                                                  | 1822                |
| 65                                                  | 2138                |
| 70                                                  | 2479                |

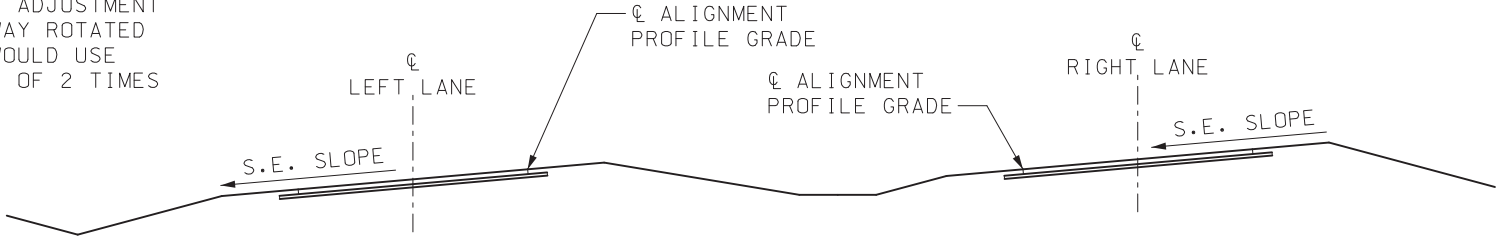
TABLE NOTE: THE EFFECT OF SPIRAL CURVE TRANSITION ON LATERAL ACCELERATION IS LIKELY TO BE NEGLIGIBLE FOR LARGER RADII.



| MULTILANE FACTORS FOR "L"                |
|------------------------------------------|
| 1.0 LANE ROTATED (2 LANE ROADBED) = 1.00 |
| 1.5 LANE ROTATED (3 LANE ROADBED) = 1.25 |
| 2.0 LANE ROTATED (4 LANE ROADBED) = 1.50 |
| 2.5 LANE ROTATED (5 LANE ROADBED) = 1.75 |
| 3.0 LANE ROTATED (6 LANE ROADBED) = 2.00 |
| 3.5 LANE ROTATED (7 LANE ROADBED) = 2.25 |

EXAMPLE: A SIX LANE DIVIDED HIGHWAY (3 LANES IN EACH DIRECTION) ROTATED SEPARATELY ABOUT ITS MEDIAN EDGES WOULD USE THE SAME ADJUSTMENT VALUE AS A SIX LANE UNDIVIDED HIGHWAY ROTATED ABOUT THE CENTERLINE. BOTH CASES WOULD USE THE 3 LANE ROTATED ADJUSTMENT VALUE OF 2 TIMES THE VALUE OF ONE LANE ROTATED.

SUPERELEVATION RUNOFF AND WIDENING TRANSITIONS WITHOUT SPIRALS



SECTION ON SUPERELEVATED CURVE CURVE TO LEFT (ILLUSTRATED)

GENERAL NOTES:

A PRACTICAL CONTROL FOR THE LENGTH OF SPIRAL "Ls" IS CONSIDERED TO BE THE SUPERELEVATION RUNOFF "L", SEE STANDARD PLANS 203.22 SHEET 1 OF 2.

"W" THE WIDENING FOR SURFACING AT INSIDE SHOULDER, SEE STANDARD PLANS 203.22 SHEET 2 OF 2.

WIDENING TRANSITION VARIES IN DIRECT PROPORTION TO DISTANCE.

SPIRAL CURVES ARE USED ON ALL ROADWAYS THAT HAVE DESIGN TRAFFIC GREATER THAN 400 VEHICLES PER DAY, AND HAVE A RADIUS LESS THAN THE VALUES LISTED IN THE "MAXIMUM RADIUS FOR USE OF A SPIRAL CURVE TRANSITION" TABLE.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

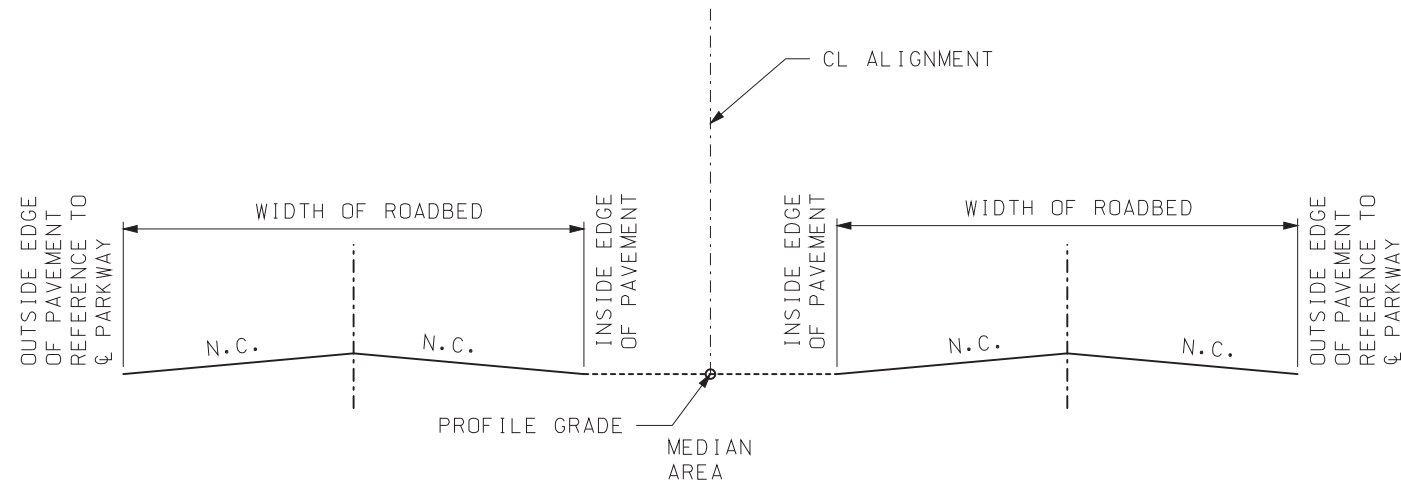


**SUPERELEVATION, SPIRALS AND WIDENING DIVIDED HIGHWAYS**

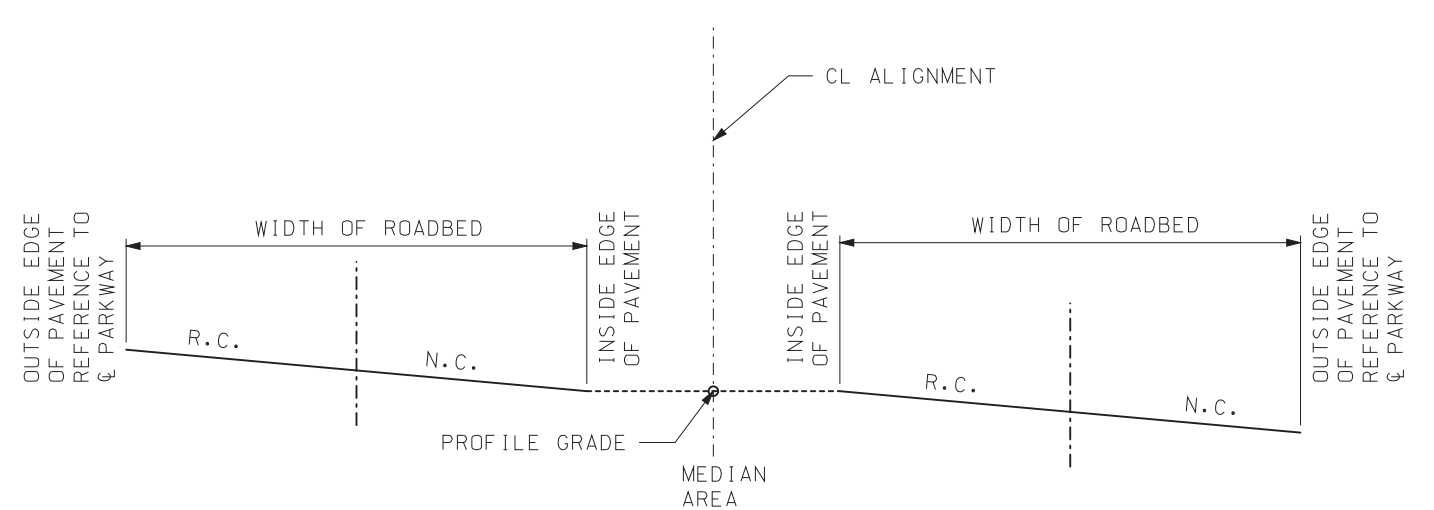
DATE EFFECTIVE: 07/01/2017

DATE PREPARED: 1/16/2024

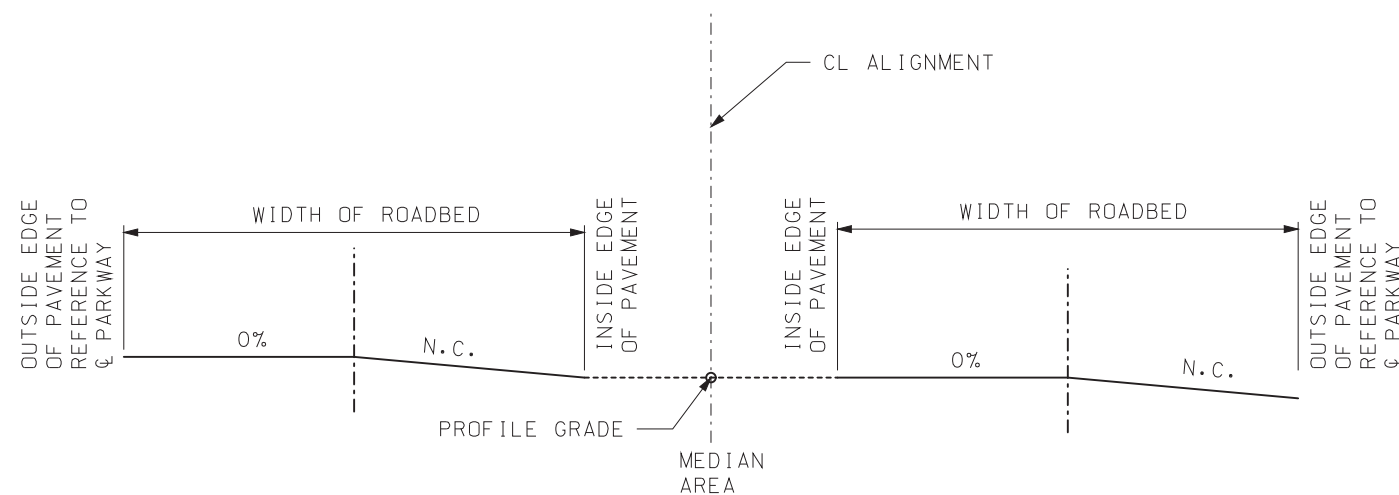
SHEET NO. 2 OF 3



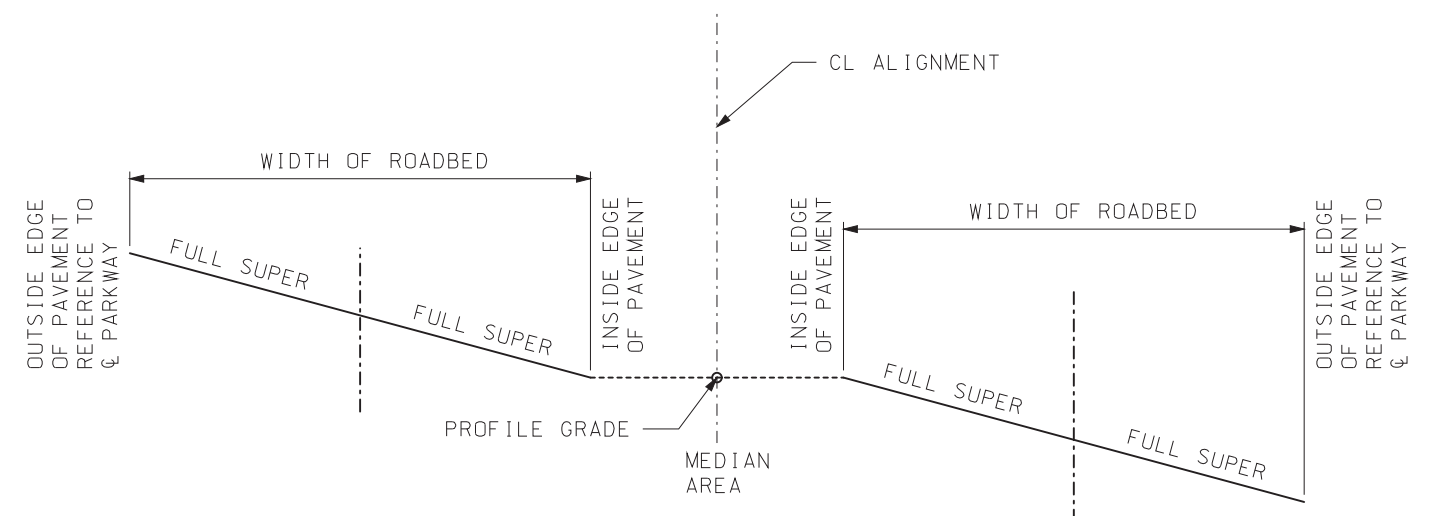
SECTION A-A



SECTION C-C  
(CURVE TO RIGHT)



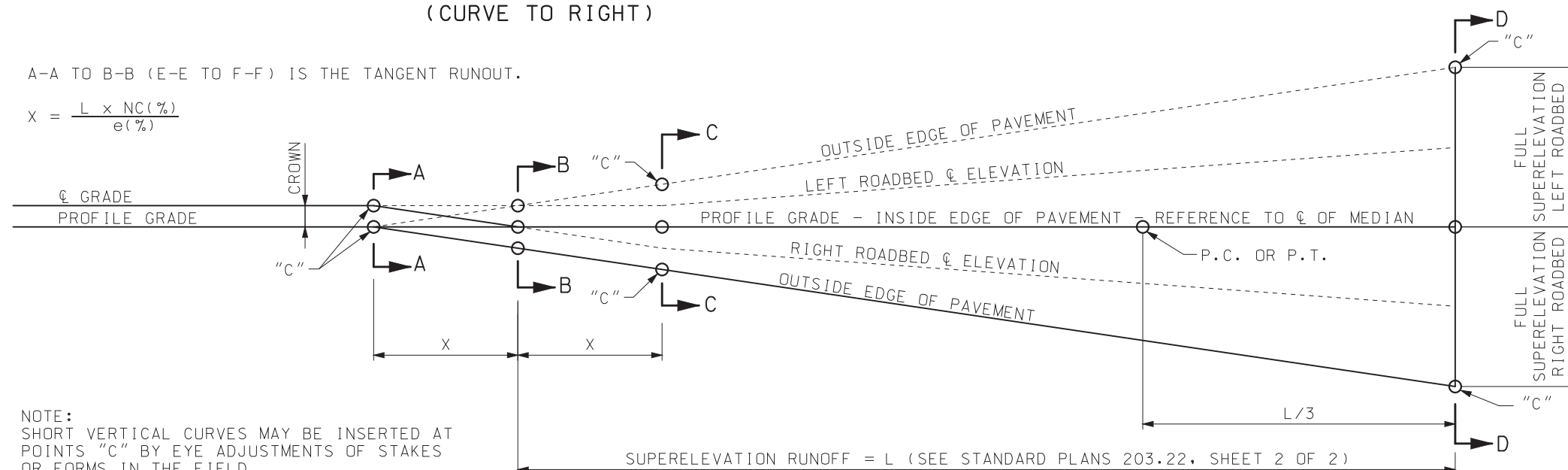
SECTION B-B  
(CURVE TO RIGHT)



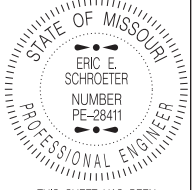
SECTION D-D  
(CURVE TO RIGHT)

A-A TO B-B (E-E TO F-F) IS THE TANGENT RUNOUT.

$$x = \frac{L \times NC(\%)}{e(\%)}$$



NOTE:  
SHORT VERTICAL CURVES MAY BE INSERTED AT  
POINTS "C" BY EYE ADJUSTMENTS OF STAKES  
OR FORMS IN THE FIELD.

|                                                                                                                                                                                                                                                |                                                                      |                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)               |                                                                      |                |
|  STATE OF MISSOURI<br>ERIC E. SCHROETER<br>NUMBER PE-28411<br>PROFESSIONAL ENGINEER<br>THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY. | <b>SUPERELEVATION,<br/>SPIRALS AND WIDENING<br/>DIVIDED HIGHWAYS</b> |                |
|                                                                                                                                                                                                                                                | DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                | <b>203.21K</b> |

| MINIMUM RADII FOR DESIGN SUPERELEVATION RATES,<br>DESIGN SPEEDS, AND $e_{\max} = 4\%$ |                    |    |     |        |    |     |        |    |     |        |    |     |        |    |     |        |    |     |        |    |     |  |
|---------------------------------------------------------------------------------------|--------------------|----|-----|--------|----|-----|--------|----|-----|--------|----|-----|--------|----|-----|--------|----|-----|--------|----|-----|--|
| e%                                                                                    | DESIGN SPEED (MPH) |    |     |        |    |     |        |    |     |        |    |     |        |    |     |        |    |     |        |    |     |  |
|                                                                                       | 30                 |    |     | 35     |    |     | 40     |    |     | 45     |    |     | 50     |    |     | 55     |    |     | 60     |    |     |  |
|                                                                                       | RADIUS             | L1 | L2  | RADIUS | L1 | L2  | RADIUS | L1 | L2  | RADIUS | L1 | L2  | RADIUS | L1 | L2  | RADIUS | L1 | L2  | RADIUS | L1 | L2  |  |
| NC                                                                                    | 2,830              | 0  | 0   | 3,730  | 0  | 0   | 4,770  | 0  | 0   | 5,930  | 0  | 0   | 7,220  | 0  | 0   | 8,650  | 0  | 0   | 10,300 | 0  | 0   |  |
| RC                                                                                    | 1,880              | 36 | 55  | 2,490  | 39 | 58  | 3,220  | 41 | 62  | 4,040  | 44 | 67  | 4,940  | 48 | 72  | 5,950  | 48 | 72  | 7,080  | 48 | 72  |  |
| 2.2                                                                                   | 1,580              | 40 | 60  | 2,120  | 43 | 64  | 2,760  | 46 | 58  | 3,480  | 49 | 73  | 4,280  | 53 | 79  | 5,180  | 53 | 79  | 6,190  | 53 | 79  |  |
| 2.4                                                                                   | 1,270              | 44 | 65  | 1,760  | 46 | 70  | 2,340  | 50 | 74  | 2,980  | 53 | 80  | 3,690  | 58 | 86  | 4,500  | 58 | 86  | 5,410  | 58 | 86  |  |
| 2.6                                                                                   | 1,000              | 47 | 71  | 1,420  | 50 | 75  | 1,930  | 54 | 81  | 2,490  | 58 | 87  | 3,130  | 62 | 94  | 3,870  | 62 | 94  | 4,700  | 62 | 94  |  |
| 2.8                                                                                   | 817                | 51 | 76  | 1,170  | 54 | 81  | 1,620  | 58 | 87  | 2,100  | 62 | 93  | 2,660  | 67 | 101 | 3,310  | 67 | 101 | 4,060  | 67 | 101 |  |
| 3.0                                                                                   | 681                | 55 | 82  | 982    | 58 | 87  | 1,370  | 62 | 93  | 1,800  | 67 | 100 | 2,290  | 72 | 108 | 2,860  | 72 | 108 | 3,530  | 72 | 108 |  |
| 3.2                                                                                   | 576                | 58 | 87  | 835    | 62 | 93  | 1,180  | 66 | 99  | 1,550  | 71 | 107 | 1,980  | 77 | 115 | 2,490  | 77 | 115 | 3,090  | 77 | 115 |  |
| 3.4                                                                                   | 490                | 62 | 93  | 714    | 66 | 99  | 1,010  | 70 | 106 | 1,340  | 76 | 113 | 1,720  | 82 | 122 | 2,170  | 82 | 122 | 2,700  | 82 | 122 |  |
| 3.6                                                                                   | 416                | 65 | 98  | 610    | 70 | 105 | 865    | 74 | 112 | 1,150  | 80 | 120 | 1,480  | 86 | 130 | 1,880  | 86 | 130 | 2,350  | 86 | 130 |  |
| 3.8                                                                                   | 348                | 69 | 104 | 512    | 74 | 110 | 730    | 79 | 118 | 970    | 84 | 127 | 1,260  | 91 | 137 | 1,600  | 91 | 137 | 2,010  | 91 | 137 |  |
| 4.0                                                                                   | 250                | 73 | 109 | 371    | 77 | 116 | 533    | 83 | 124 | 711    | 89 | 133 | 926    | 96 | 144 | 1,190  | 96 | 144 | 1,500  | 96 | 144 |  |

TABLE NOTES:

“NC” DENOTES NORMAL CROSS SLOPE.

“RC” DENOTES REMOVE ADVERSE CROSS SLOPE,  
SUPERELEVATE AT NORMAL CROSS SLOPE.

“e” DENOTES THE SUPERELEVATION IN PERCENT (%).

“L” THE LENGTH OF SUPERELEVATION RUNOFF AND  
WIDENING TRANSITION IN FEET FOR A 2 LANE  
ROADWAY.

THE L1 COLUMN IS FOR 1 LANE ROTATED  
THE L2 COLUMN IS FOR 2 LANES ROTATED

1 LANE ROTATED IS TYPICALLY FOR A 2-LANE HIGHWAY  
2 LANE ROTATED IS TYPICALLY FOR A 4-LANE HIGHWAY

WHEN USING ONE OF THE TABLES FOR A GIVEN  
RADIUS, INTERPOLATION IS NOT NECESSARY AS  
THE SUPERELEVATION RATE SHOULD BE  
DETERMINED FROM A RADIUS EQUAL TO, OR  
SLIGHTLY SMALLER THAN, THE RADII  
PROVIDED IN THE TABLE. THE RESULT IS A  
SUPERELEVATION RATE THAT IS ROUNDED UP  
TO THE NEAREST 0.2 OF A PERCENT.

EXAMPLE: A 50 MPH CURVE WITH A MAXIMUM  
SUPERELEVATION RATE OF 8 PERCENT, AND A RADIUS  
OF 1,910 FT, SHOULD USE THE RADIUS OF 1,830 FT  
TO OBTAIN A SUPERELEVATION RATE OF 5.4 PERCENT.

| MINIMUM RADII FOR DESIGN SUPERELEVATION RATES,<br>DESIGN SPEEDS, AND $e_{\max} = 8\%$ |                    |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |
|---------------------------------------------------------------------------------------|--------------------|-----|-----|--------|-----|-----|--------|-----|-----|--------|-----|-----|--------|-----|-----|--------|-----|-----|--------|-----|-----|--------|-----|-----|--------|-----|-----|
| e%                                                                                    | DESIGN SPEED (MPH) |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |        |     |     |
|                                                                                       | 30                 |     |     | 35     |     |     | 40     |     |     | 45     |     |     | 50     |     |     | 55     |     |     | 60     |     |     | 65     |     |     | 70     |     |     |
|                                                                                       | RADIUS             | L1  | L2  | RADIUS | L1  | L2  | RADIUS | L1  | L2  | RADIUS | L1  | L2  | RADIUS | L1  | L2  | RADIUS | L1  | L2  | RADIUS | L1  | L2  | RADIUS | L1  | L2  | RADIUS | L1  | L2  |
| NC                                                                                    | 3,240              | 0   | 0   | 4,260  | 0   | 0   | 5,410  | 0   | 0   | 6,710  | 0   | 0   | 8,150  | 0   | 0   | 9,720  | 0   | 0   | 11,500 | 0   | 0   | 12,900 | 0   | 0   | 14,500 | 0   | 0   |
| RC                                                                                    | 2,370              | 36  | 55  | 3,120  | 39  | 58  | 3,970  | 41  | 62  | 4,930  | 44  | 67  | 5,990  | 48  | 72  | 7,150  | 48  | 72  | 8,440  | 48  | 72  | 9,510  | 48  | 72  | 10,700 | 48  | 72  |
| 2.2                                                                                   | 2,130              | 40  | 60  | 2,800  | 43  | 64  | 3,570  | 46  | 58  | 4,440  | 49  | 73  | 5,400  | 53  | 79  | 6,450  | 53  | 79  | 7,620  | 53  | 79  | 8,600  | 53  | 79  | 9,660  | 53  | 79  |
| 2.4                                                                                   | 1,930              | 44  | 65  | 2,540  | 46  | 70  | 3,240  | 50  | 74  | 4,030  | 53  | 80  | 4,910  | 58  | 86  | 5,870  | 58  | 86  | 6,930  | 58  | 86  | 7,830  | 58  | 86  | 8,810  | 58  | 86  |
| 2.6                                                                                   | 1,760              | 47  | 71  | 2,320  | 50  | 75  | 2,960  | 54  | 81  | 3,690  | 58  | 87  | 4,490  | 62  | 94  | 5,370  | 62  | 94  | 6,350  | 62  | 94  | 7,180  | 62  | 94  | 8,090  | 62  | 94  |
| 2.8                                                                                   | 1,610              | 51  | 76  | 2,130  | 54  | 81  | 2,720  | 58  | 87  | 3,390  | 62  | 93  | 4,130  | 67  | 101 | 4,950  | 67  | 101 | 5,850  | 67  | 101 | 6,630  | 67  | 101 | 7,470  | 67  | 101 |
| 3.0                                                                                   | 1,480              | 55  | 82  | 1,960  | 58  | 87  | 2,510  | 62  | 93  | 3,130  | 67  | 100 | 3,820  | 72  | 108 | 4,580  | 72  | 108 | 5,420  | 72  | 108 | 6,140  | 72  | 108 | 6,930  | 72  | 108 |
| 3.2                                                                                   | 1,370              | 58  | 87  | 1,820  | 62  | 93  | 2,330  | 66  | 99  | 2,900  | 71  | 107 | 3,550  | 77  | 115 | 4,250  | 77  | 115 | 5,040  | 77  | 115 | 5,720  | 77  | 115 | 6,460  | 77  | 115 |
| 3.4                                                                                   | 1,270              | 62  | 93  | 1,690  | 66  | 99  | 2,170  | 70  | 106 | 2,700  | 76  | 113 | 3,300  | 82  | 122 | 3,970  | 82  | 122 | 4,700  | 82  | 122 | 5,350  | 82  | 122 | 6,050  | 82  | 122 |
| 3.6                                                                                   | 1,180              | 65  | 98  | 1,570  | 70  | 105 | 2,020  | 74  | 112 | 2,520  | 80  | 120 | 3,090  | 86  | 130 | 3,710  | 86  | 130 | 4,400  | 86  | 130 | 5,010  | 86  | 130 | 5,680  | 86  | 130 |
| 3.8                                                                                   | 1,100              | 69  | 104 | 1,470  | 74  | 110 | 1,890  | 79  | 118 | 2,360  | 84  | 127 | 2,890  | 91  | 137 | 3,480  | 91  | 137 | 4,140  | 91  | 137 | 4,700  | 91  | 137 | 5,350  | 91  | 137 |
| 4.0                                                                                   | 1,030              | 73  | 109 | 1,370  | 77  | 116 | 1,770  | 83  | 124 | 2,220  | 89  | 133 | 2,720  | 96  | 144 | 3,270  | 96  | 144 | 3,890  | 96  | 144 | 4,450  | 96  | 144 | 5,050  | 96  | 144 |
| 4.2                                                                                   | 955                | 76  | 115 | 1,280  | 81  | 122 | 1,660  | 87  | 130 | 2,080  | 93  | 140 | 2,560  | 101 | 151 | 3,080  | 101 | 151 | 3,670  | 101 | 151 | 4,200  | 101 | 151 | 4,780  | 101 | 151 |
| 4.4                                                                                   | 893                | 80  | 120 | 1,200  | 85  | 128 | 1,560  | 91  | 137 | 1,960  | 98  | 147 | 2,410  | 106 | 158 | 2,910  | 106 | 158 | 3,470  | 106 | 158 | 3,980  | 106 | 158 | 4,540  | 106 | 158 |
| 4.6                                                                                   | 834                | 84  | 125 | 1,130  | 89  | 134 | 1,470  | 95  | 143 | 1,850  | 102 | 153 | 2,280  | 110 | 166 | 2,750  | 110 | 166 | 3,290  | 110 | 166 | 3,770  | 110 | 166 | 4,310  | 110 | 166 |
| 4.8                                                                                   | 779                | 87  | 131 | 1,060  | 93  | 139 | 1,390  | 99  | 149 | 1,750  | 107 | 160 | 2,160  | 115 | 173 | 2,610  | 115 | 173 | 3,120  | 115 | 173 | 3,590  | 115 | 173 | 4,100  | 115 | 173 |
| 5.0                                                                                   | 727                | 91  | 136 | 991    | 97  | 145 | 1,310  | 103 | 155 | 1,650  | 111 | 167 | 2,040  | 120 | 180 | 2,470  | 120 | 180 | 2,960  | 120 | 180 | 3,410  | 120 | 180 | 3,910  | 120 | 180 |
| 5.2                                                                                   | 676                | 95  | 142 | 929    | 101 | 151 | 1,230  | 108 | 161 | 1,560  | 116 | 173 | 1,930  | 125 | 187 | 2,350  | 125 | 187 | 2,820  | 125 | 187 | 3,250  | 125 | 187 | 3,740  | 125 | 187 |
| 5.4                                                                                   | 627                | 98  | 147 | 870    | 105 | 157 | 1,160  | 112 | 168 | 1,480  | 120 | 180 | 1,830  | 130 | 194 | 2,230  | 130 | 194 | 2,680  | 130 | 194 | 3,110  | 130 | 194 | 3,570  | 130 | 194 |
| 5.6                                                                                   | 582                | 102 | 153 | 813    | 108 | 163 | 1,090  | 116 | 174 | 1,390  | 124 | 187 | 1,740  | 134 | 202 | 2,120  | 134 | 202 | 2,550  | 134 | 202 | 2,970  | 134 | 202 | 3,420  | 134 | 202 |
| 5.8                                                                                   | 542                | 105 | 158 | 761    | 112 | 168 | 1,030  | 120 | 180 | 1,320  | 129 | 193 | 1,650  | 139 | 209 | 2,010  | 139 | 209 | 2,430  | 139 | 209 | 2,840  | 139 | 209 | 3,280  | 139 | 209 |
| 6.0                                                                                   | 506                | 109 | 164 | 713    | 116 | 174 | 965    | 124 | 186 | 1,250  | 133 | 200 | 1,560  | 144 | 216 | 1,920  | 144 | 216 | 2,320  | 144 | 216 | 2,710  | 144 | 216 | 3,150  | 144 | 216 |
| 6.2                                                                                   | 472                | 113 | 169 | 669    | 120 | 180 | 909    | 128 | 192 | 1,180  | 138 | 207 | 1,480  | 149 | 223 | 1,820  | 149 | 223 | 2,210  | 149 | 223 | 2,600  | 149 | 223 | 3,020  | 149 | 223 |
| 6.4                                                                                   | 442                | 116 | 175 | 628    | 124 | 186 | 857    | 132 | 199 | 1,110  | 142 | 213 | 1,400  | 154 | 230 | 1,730  | 154 | 230 | 2,110  | 154 | 230 | 2,490  | 154 | 230 | 2,910  | 154 | 230 |
| 6.6                                                                                   | 413                | 120 | 180 | 590    | 128 | 192 | 808    | 137 | 205 | 1,050  | 147 | 220 | 1,330  | 158 | 238 | 1,650  | 158 | 238 | 2,010  | 158 | 238 | 2,380  | 158 | 238 | 2,790  | 158 | 238 |
| 6.8                                                                                   | 386                | 124 | 185 | 553    | 132 | 197 | 761    | 141 | 211 | 990    | 151 | 227 | 1,260  | 163 | 245 | 1,560  | 163 | 245 | 1,910  | 163 | 245 | 2,280  | 163 | 245 | 2,690  | 163 | 245 |
| 7.0                                                                                   | 360                | 127 | 191 | 518    | 135 | 203 | 716    | 145 | 217 | 933    | 156 | 233 | 1,190  | 168 | 252 | 1,480  | 168 | 252 | 1,820  | 168 | 252 | 2,180  | 168 | 252 | 2,580  | 168 | 252 |
| 7.2                                                                                   | 336                | 131 | 196 | 485    | 139 | 209 | 672    | 149 | 223 | 878    | 160 | 240 | 1,120  | 173 | 259 | 1,400  | 173 | 259 | 1,720  | 173 | 259 | 2,070  | 173 | 259 | 2,470  | 173 | 259 |
| 7.4                                                                                   | 312                | 135 | 202 | 451    | 143 | 215 | 628    | 153 | 230 | 822    | 164 | 247 | 1,060  | 178 | 266 | 1,320  | 178 | 266 | 1,630  | 178 | 266 | 1,970  | 178 | 266 | 2,350  | 178 | 266 |
| 7.6                                                                                   | 287                | 138 | 207 | 417    | 147 | 221 | 583    | 157 | 236 | 765    | 169 | 253 | 980    | 182 | 274 | 1,230  | 182 | 274 | 1,530  | 182 | 274 | 1,850  | 182 | 274 | 2,230  | 182 | 274 |
| 7.8                                                                                   | 261                | 142 | 213 | 380    | 151 | 226 | 533    | 161 | 242 | 701    | 173 | 260 | 901    | 187 | 281 | 1,140  | 187 | 281 | 1,410  | 187 | 281 | 1,720  | 187 | 281 | 2,090  | 187 | 281 |
| 8.0                                                                                   | 214                | 145 | 218 | 314    | 155 | 232 | 444    | 166 | 248 | 587    | 178 | 267 | 758    | 192 | 288 | 960    | 192 | 288 | 1,200  | 192 | 288 | 1,480  | 192 | 288 | 1,810  | 192 | 288 |



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

KENNETH L. VOSS

NUMBER PE-2002016747

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

| "W"                                                                                                                                       |                    |     |     |     |     |     |     |                    |      |     |     |     |     |     |                    |      |      |     |     |     |     |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|-----|-----|-----|-----|-----|--------------------|------|-----|-----|-----|-----|-----|--------------------|------|------|-----|-----|-----|-----|
| CALCULATED AND DESIGN VALUES FOR TRAVELED WAY WIDENING ON OPEN HIGHWAY CURVES<br>(TWOLANE HIGHWAYS, ONE-WAY OR TWO-WAY)[WB-67 ADJUSTMENT] |                    |     |     |     |     |     |     |                    |      |     |     |     |     |     |                    |      |      |     |     |     |     |
| CURVE<br>RADIUS<br>(FT)                                                                                                                   | 24' ROADWAY WIDTH  |     |     |     |     |     |     | 22' ROADWAY WIDTH  |      |     |     |     |     |     | 20' ROADWAY WIDTH  |      |      |     |     |     |     |
|                                                                                                                                           | DESIGN SPEED (MPH) |     |     |     |     |     |     | DESIGN SPEED (MPH) |      |     |     |     |     |     | DESIGN SPEED (MPH) |      |      |     |     |     |     |
|                                                                                                                                           | 30                 | 35  | 40  | 45  | 50  | 55  | 60  | 30                 | 35   | 40  | 45  | 50  | 55  | 60  | 30                 | 35   | 40   | 45  | 50  | 55  | 60  |
| 7000                                                                                                                                      | 0.1                | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.8                | 0.8  | 0.9 | 0.9 | 1.0 | 1.1 | 1.1 | 1.8                | 1.8  | 1.9  | 1.9 | 2.0 | 2.1 | 2.1 |
| 6500                                                                                                                                      | 0.1                | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.8                | 0.9  | 0.9 | 1.0 | 1.1 | 1.1 | 1.2 | 1.8                | 1.9  | 1.9  | 2.0 | 2.1 | 2.1 | 2.2 |
| 6000                                                                                                                                      | 0.1                | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.8                | 0.9  | 1.0 | 1.0 | 1.1 | 1.2 | 1.2 | 1.8                | 1.9  | 2.0  | 2.0 | 2.1 | 2.2 | 2.3 |
| 5500                                                                                                                                      | 0.1                | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.9                | 1.0  | 1.0 | 1.1 | 1.2 | 1.2 | 1.3 | 1.9                | 2.0  | 2.0  | 2.1 | 2.2 | 2.2 | 2.4 |
| 5000                                                                                                                                      | 0.1                | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.5 | 1.0                | 1.0  | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 2.0                | 2.0  | 2.1  | 2.2 | 2.2 | 2.3 | 2.5 |
| 4500                                                                                                                                      | 0.1                | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.6 | 1.0                | 1.1  | 1.2 | 1.2 | 1.3 | 1.4 | 1.5 | 2.0                | 2.1  | 2.2  | 2.2 | 2.3 | 2.4 | 2.6 |
| 4000                                                                                                                                      | 0.1                | 0.2 | 0.3 | 0.3 | 0.4 | 0.5 | 0.7 | 1.1                | 1.2  | 1.3 | 1.3 | 1.4 | 1.5 | 1.6 | 2.1                | 2.2  | 2.3  | 2.3 | 2.4 | 2.5 | 2.7 |
| 3500                                                                                                                                      | 0.2                | 0.3 | 0.4 | 0.5 | 0.6 | 0.6 | 0.8 | 1.2                | 1.3  | 1.4 | 1.5 | 1.6 | 1.6 | 1.7 | 2.2                | 2.3  | 2.4  | 2.5 | 2.6 | 2.6 | 2.8 |
| 3000                                                                                                                                      | 0.4                | 0.5 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.4                | 1.5  | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.4                | 2.5  | 2.5  | 2.6 | 2.7 | 2.8 | 2.9 |
| 2500                                                                                                                                      | 0.7                | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.7                | 1.8  | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.7                | 2.8  | 2.9  | 3.0 | 3.1 | 3.2 | 3.3 |
| 2000                                                                                                                                      | 0.9                | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.9                | 2.1  | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.9                | 3.1  | 3.2  | 3.3 | 3.4 | 3.5 | 3.6 |
| 1800                                                                                                                                      | 1.1                | 1.2 | 1.3 | 1.5 | 1.6 | 1.7 | 1.8 | 2.1                | 2.2  | 2.3 | 2.5 | 2.6 | 2.7 | 2.8 | 3.1                | 3.2  | 3.3  | 3.5 | 3.6 | 3.7 | 3.8 |
| 1600                                                                                                                                      | 1.3                | 1.4 | 1.5 | 1.7 | 1.8 | 1.9 | 2.0 | 2.3                | 2.4  | 2.5 | 2.7 | 2.8 | 2.9 | 3.0 | 3.3                | 3.4  | 3.5  | 3.7 | 3.8 | 3.9 | 4.0 |
| 1400                                                                                                                                      | 1.6                | 1.8 | 1.9 | 2.0 | 2.2 | 2.3 | 2.4 | 2.6                | 2.8  | 2.9 | 3.0 | 3.2 | 3.3 | 3.4 | 3.6                | 3.8  | 3.9  | 4.0 | 4.4 | 4.3 | 4.4 |
| 1200                                                                                                                                      | 2.0                | 2.1 | 2.2 | 2.4 | 2.5 | 2.7 | 2.8 | 3.0                | 3.1  | 3.2 | 3.4 | 3.5 | 3.7 | 3.8 | 4.0                | 4.1  | 4.2  | 4.4 | 4.5 | 4.7 | 4.8 |
| 1000                                                                                                                                      | 2.5                | 2.7 | 2.8 | 3.0 | 3.1 | 3.3 | 3.4 | 3.5                | 3.7  | 3.8 | 4.0 | 4.1 | 4.3 | 4.4 | 4.5                | 4.7  | 4.8  | 5.0 | 5.1 | 5.3 | 5.4 |
| 900                                                                                                                                       | 2.8                | 3.0 | 3.1 | 3.3 | 3.5 | 3.6 |     | 3.8                | 4.0  | 4.1 | 4.3 | 4.5 | 4.6 |     | 4.8                | 5.0  | 5.1  | 5.3 | 5.5 | 5.6 |     |
| 800                                                                                                                                       | 3.2                | 3.4 | 3.6 | 3.8 | 4.0 | 4.1 |     | 4.2                | 4.4  | 4.6 | 4.8 | 5.0 | 5.1 |     | 5.2                | 5.4  | 5.6  | 5.8 | 6.0 | 6.1 |     |
| 700                                                                                                                                       | 3.8                | 4.0 | 4.2 | 4.4 | 4.6 |     |     | 4.8                | 5.0  | 5.2 | 5.4 | 5.6 |     |     | 5.8                | 6.0  | 6.2  | 6.4 | 6.6 |     |     |
| 600                                                                                                                                       | 4.5                | 4.7 | 4.9 | 5.1 | 5.3 |     |     | 5.5                | 5.7  | 5.9 | 6.1 | 6.3 |     |     | 6.5                | 6.7  | 6.9  | 7.1 | 7.3 |     |     |
| 500                                                                                                                                       | 5.4                | 5.7 | 5.9 | 6.1 |     |     |     | 6.4                | 6.7  | 6.9 | 7.1 |     |     |     | 7.4                | 7.7  | 7.9  | 8.1 |     |     |     |
| 450                                                                                                                                       | 6.1                | 6.3 | 6.6 |     |     |     |     | 7.1                | 7.3  | 7.6 |     |     |     |     | 8.1                | 8.3  | 8.6  |     |     |     |     |
| 400                                                                                                                                       | 6.9                | 7.1 | 7.4 |     |     |     |     | 7.9                | 8.1  | 8.4 |     |     |     |     | 8.9                | 9.1  | 9.4  |     |     |     |     |
| 350                                                                                                                                       | 7.9                | 8.1 | 8.4 |     |     |     |     | 8.9                | 9.1  | 9.4 |     |     |     |     | 9.9                | 10.1 | 10.4 |     |     |     |     |
| 300                                                                                                                                       | 9.2                | 9.5 |     |     |     |     |     | 10.2               | 10.5 |     |     |     |     |     | 11.2               | 11.5 |      |     |     |     |     |
| 250                                                                                                                                       | 11.2               |     |     |     |     |     |     | 12.2               |      |     |     |     |     |     | 13.2               |      |      |     |     |     |     |
| 200                                                                                                                                       | 14.0               |     |     |     |     |     |     | 15.0               |      |     |     |     |     |     | 16.0               |      |      |     |     |     |     |

TABLE NOTES:

"W" THE WIDENING IN FEET FOR SURFACING AT INSIDE SHOULDERS.

VALUES SHOWN ARE FOR WB-67 DESIGN VEHICLE AND REPRESENT WIDENING IN FEET.

VALUES LESS THAN 2.0 FEET MAY BE DISREGARDED.

FOR 3-LANE ROADWAYS, MULTIPLY ABOVE VALUES BY 1.5.

FOR 4-LANE ROADWAYS, MULTIPLY ABOVE VALUES BY 2.0.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
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STATE OF MISSOURI  
KENNETH L. VOSS  
NUMBER  
PE-2002016747  
PROFESSIONAL ENGINEER

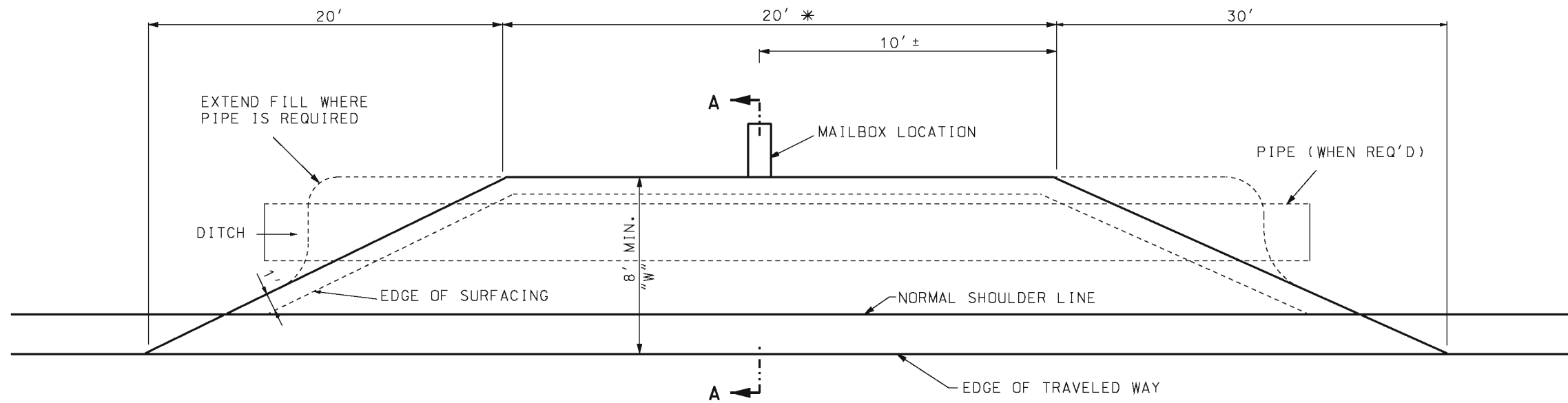
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

SUPERELEVATION,  
SPIRALS AND WIDENING

DATE EFFECTIVE: 4/1/2024  
DATE PREPARED: 1/16/2024

203.22A

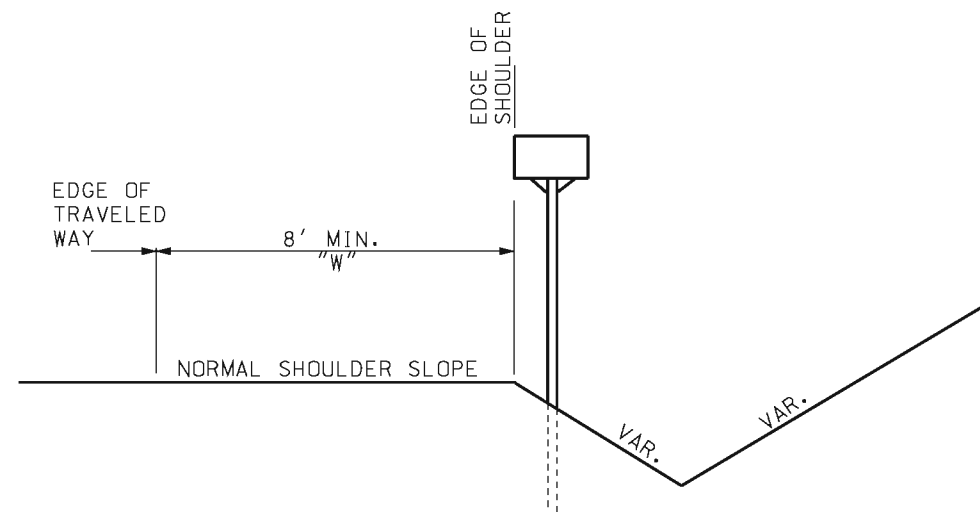
SHEET NO.  
2 OF 2



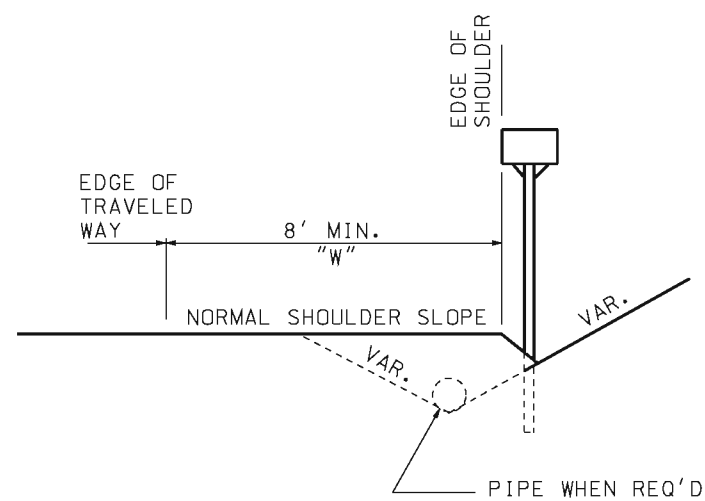
\* ADD 2' FOR EACH  
ADDITIONAL MAILBOX

℄ PAVEMENT

## PLAN



SECTION A-A  
(WITHOUT PIPE)



SECTION A-A  
(WITH PIPE)

## GENERAL NOTES:

IN NO CASE WILL "W" BE LESS THAN SHOULDER WIDTH.  
"W" WILL BE 8' UNLESS OTHERWISE NOTED ON THE PLANS.

WHEN ENTRANCES ARE ADJACENT TO MAILBOX TURNOUTS,  
THE AREA AND SURFACING OF THE ENTRANCE MAY BE USED  
FOR A PORTION OF THE MAILBOX TURNOUT.



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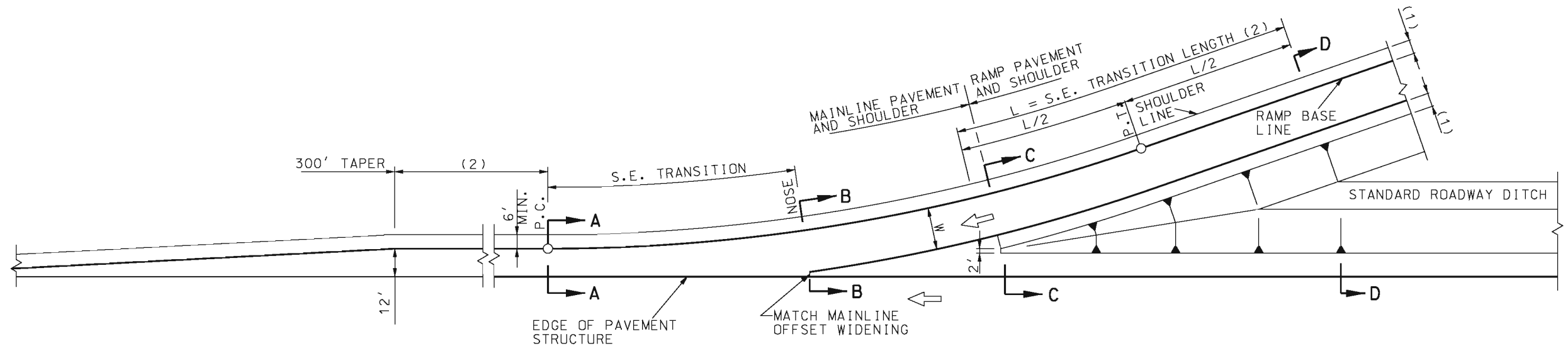
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## MAILBOX TURNOUTS

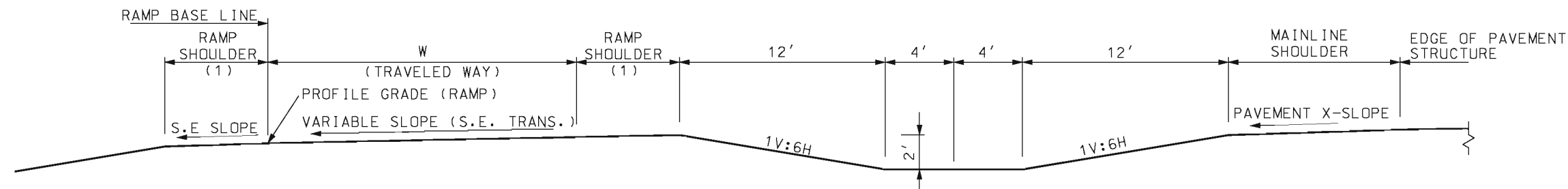
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DATE PREPARED: 8/21/2009

**203.35A**

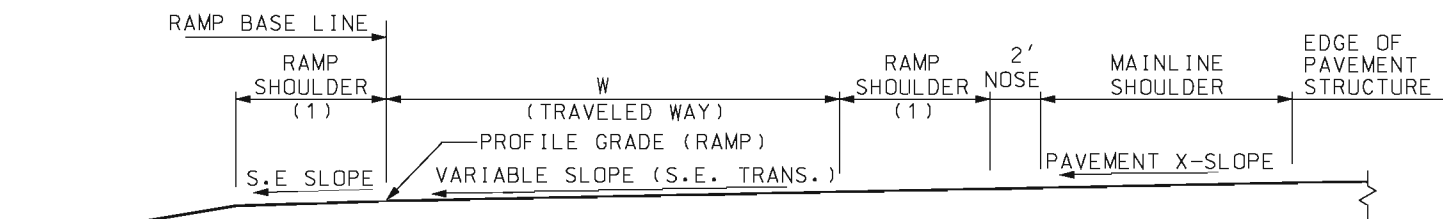
SHEET NO.  
1 OF 1



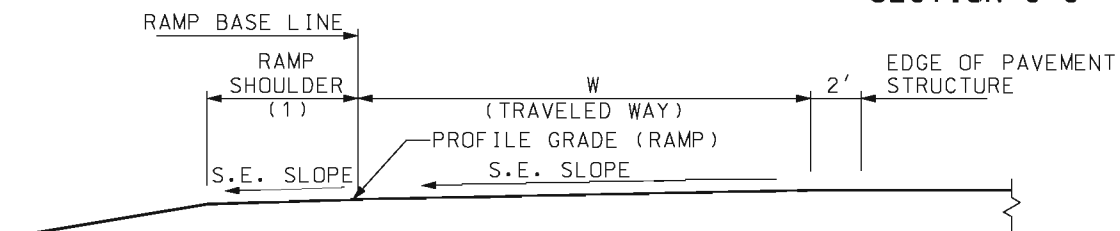
PLAN VIEW "ON" RAMPS



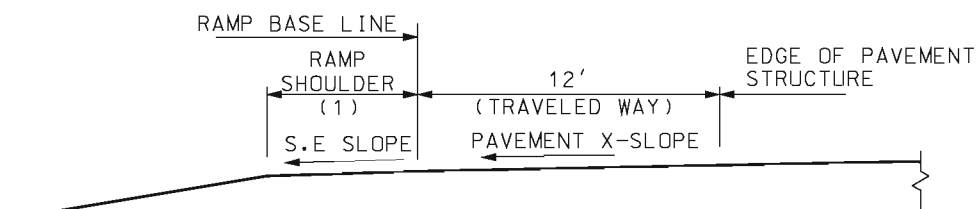
SECTION D-D



SECTION C-C



SECTION B-B



SECTION A-A

| W   | RAMP WIDTH                                                                                            |
|-----|-------------------------------------------------------------------------------------------------------|
| 14' | ONE LANE, ONE WAY OPERATION WITH NO PROVISION FOR PASSING STALLED VEHICLES. DESIGN TRUCK VOLUMES > 5% |
| 12' | ONE LANE, ONE WAY OPERATION WITH NO PROVISION FOR PASSING STALLED VEHICLES. DESIGN TRUCK VOLUMES ≤ 5% |

NOTES:

- (1) FOR RAMP SHOULDER WIDTH, SEE TYPICAL SECTIONS.  
 (2) SEE ROADWAY PLANS.

GENERAL NOTES:

SEE OTHER DRAWINGS FOR JOINT LAYOUTS AND STRIPING DETAILS.

THIS DRAWING IS FOR GENERAL INFORMATION ONLY. FOR ACTUAL CONSTRUCTION DETAILS AND PAVEMENT TYPES, SEE OTHER DRAWINGS.

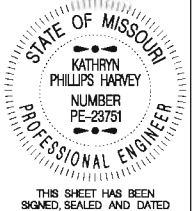


**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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**TYPICAL DETAILS  
ON AND OFF RAMPS**

**DIAMOND INTERCHANGES AND  
OUTER RAMPS OF CLOVERLEAF  
INTERCHANGES**



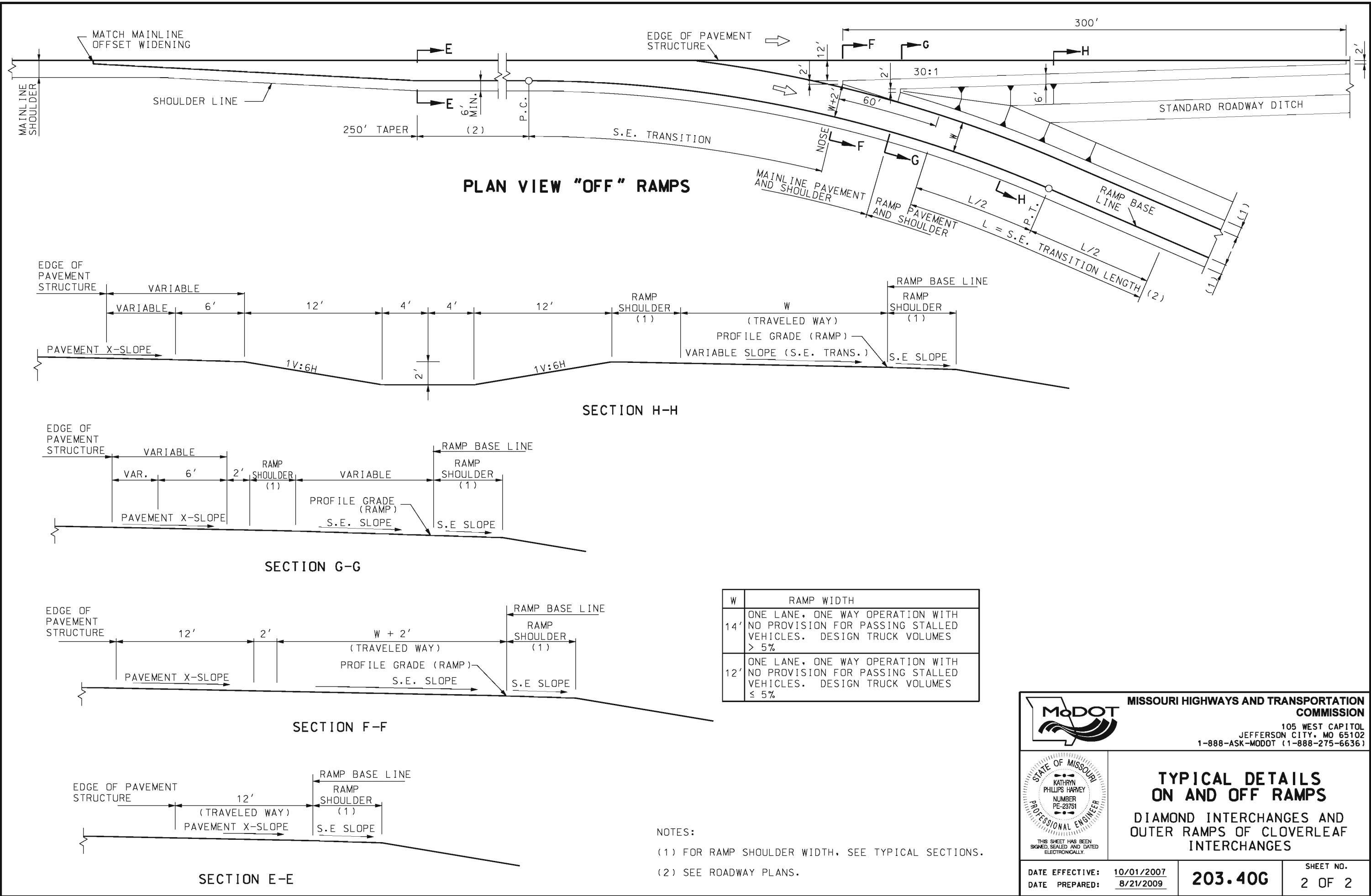
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DATE EFFECTIVE: 10/01/2007  
DATE PREPARED: 8/21/2009

**203.40G**

SHEET NO.  
1 OF 2



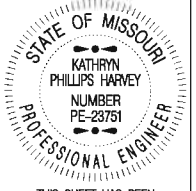


IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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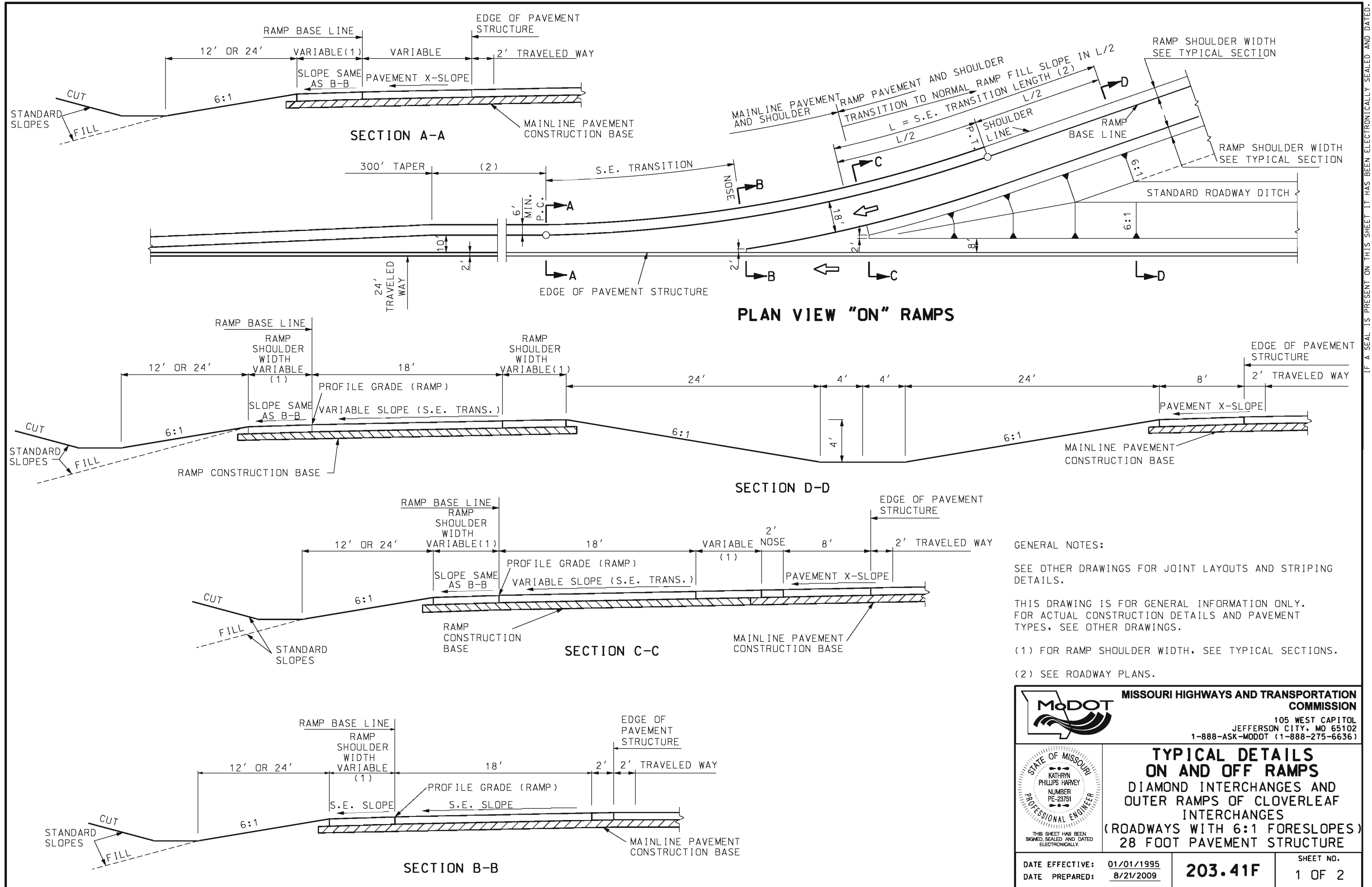


**TYPICAL DETAILS ON AND OFF RAMPS**

**DIAMOND INTERCHANGES AND OUTER RAMPS OF CLOVERLEAF INTERCHANGES**

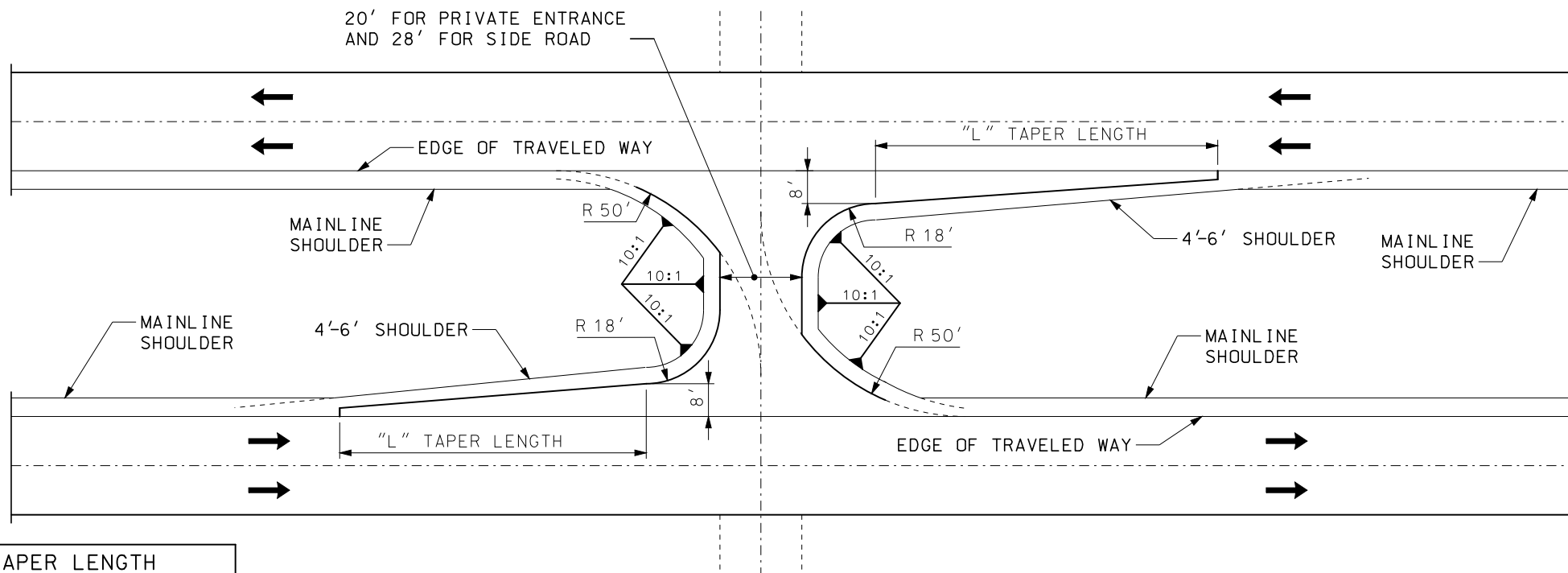
|                 |            |                |                     |
|-----------------|------------|----------------|---------------------|
| DATE EFFECTIVE: | 10/01/2007 | <b>203.40G</b> | SHEET NO.<br>2 OF 2 |
| DATE PREPARED:  | 8/21/2009  |                |                     |





IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.





| TAPER LENGTH |        |
|--------------|--------|
| DESIGN SPEED | "L"    |
| ≤ 40 MPH     | 112.5' |
| > 40 MPH     | 225'   |

FOR PRIVATE ENTRANCES, MINOR SIDE ROADS OR FIELD ENTRANCES

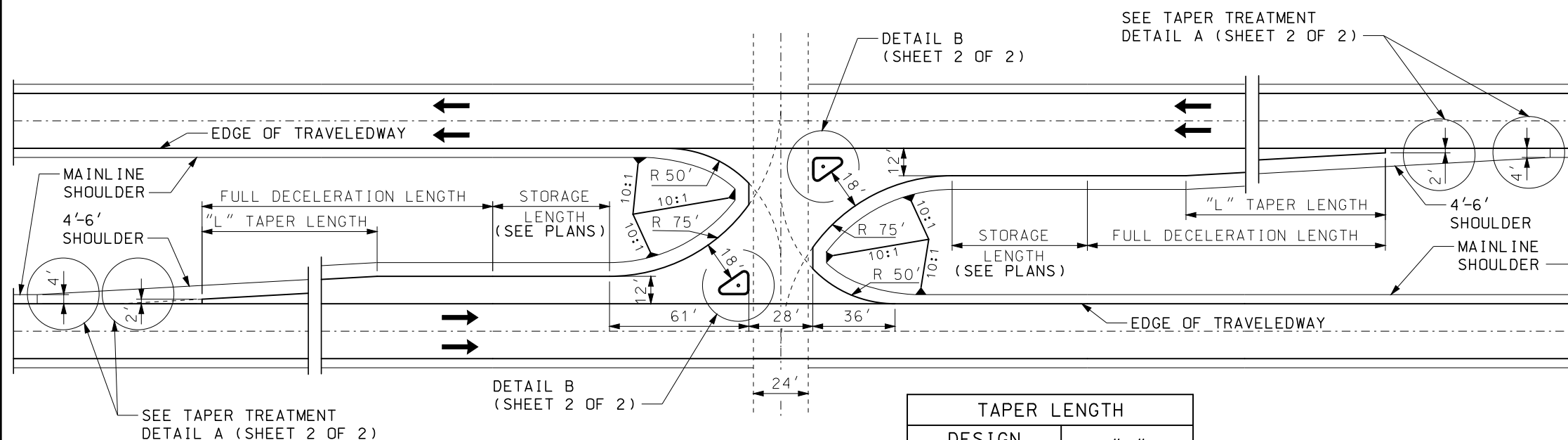
### TYPE I MEDIAN OPENING

#### NOTES FOR TYPE I MEDIAN OPENINGS:

MEDIAN OPENINGS AND TAPERS SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND THICKNESS AS THE TRAVELED WAY.

SHOULDERS ADJACENT TO THE MEDIAN OPENING AND TAPERS SHALL BE A2 SHOULDERS FOR INTERSTATE AND MAJOR ROADWAYS OR A3 SHOULDERS FOR LOW VOLUME MAJORS AND MINOR ROADS.

IN ADDITION TO THE IDENTIFIED SLOPES, SLOPES ADJACENT TO MEDIAN OPENING SHOULDERS SHALL NOT BE STEEPER THAN 5.5:1.



| FULL DECELERATION LENGTH |                |
|--------------------------|----------------|
| DESIGN SPEED             | MINIMUM LENGTH |
| 45 MPH                   | 385 FT.        |
| 50 MPH                   | 435 FT.        |
| 55 MPH                   | 480 FT.        |
| 60 MPH                   | 530 FT.        |
| 65 MPH                   | 570 FT.        |
| 70 MPH                   | 615 FT.        |

| TAPER LENGTH |      |
|--------------|------|
| DESIGN SPEED | "L"  |
| ≤ 40 MPH     | 125' |
| > 40 MPH     | 250' |

FOR MAJOR SIDE ROADS, STATE ROUTES AND MAJOR COMMERCIAL ENTRANCES

### TYPE II MEDIAN OPENING

#### NOTES FOR TYPE II MEDIAN OPENINGS:

MEDIAN OPENINGS AND TAPERS SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND THICKNESS AS THE TRAVELED WAY.

SHOULDERS ADJACENT TO THE MEDIAN OPENING AND TAPERS SHALL BE A2 SHOULDERS FOR INTERSTATE AND MAJOR ROADWAYS OR A3 SHOULDERS FOR LOW VOLUME MAJORS AND MINOR ROADS.

IN ADDITION TO THE IDENTIFIED SLOPES, SLOPES ADJACENT TO MEDIAN OPENING SHOULDERS SHALL NOT BE STEEPER THAN 5.5:1.

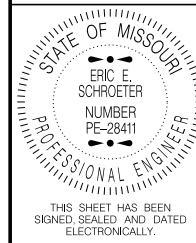


**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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**TYPICAL MEDIAN OPENING**

DIVIDED HIGHWAYS



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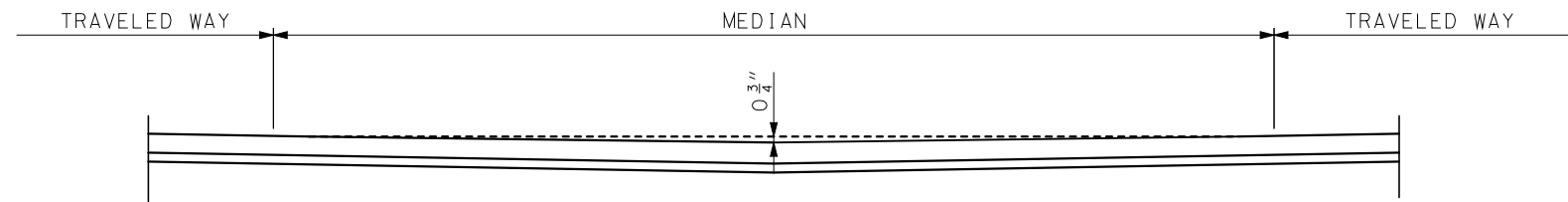
DATE EFFECTIVE: 04/01/2016

DATE PREPARED: 2/11/2016

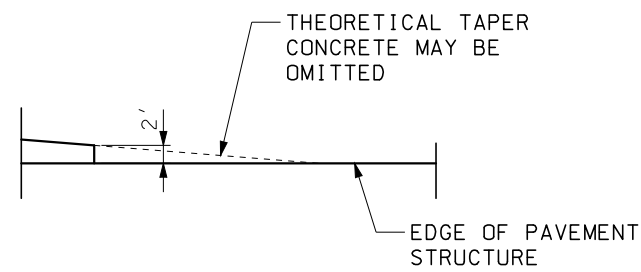
203.50N

SHEET NO.

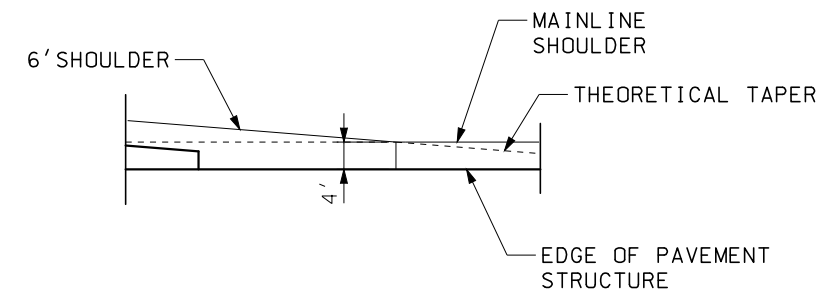
1 OF 2



SECTION ALONG MEDIAN OPENING &

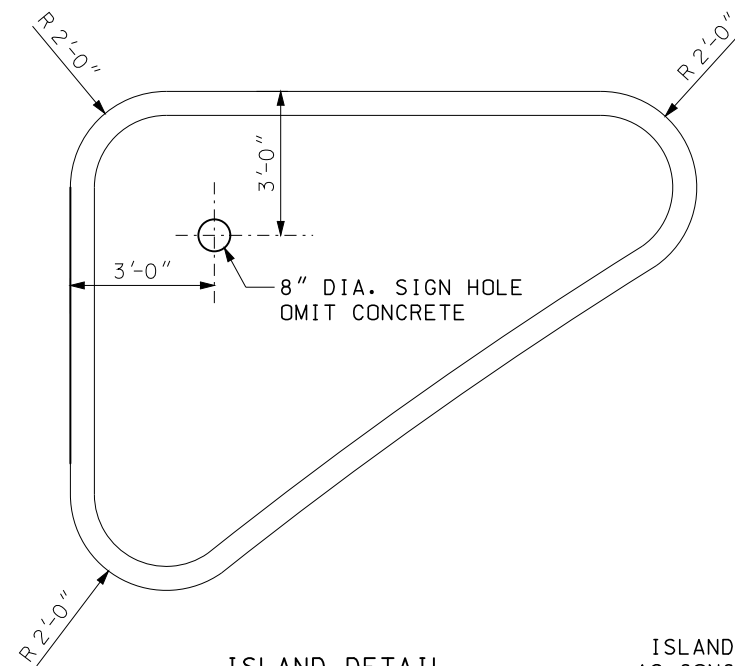


TAPER TREATMENT



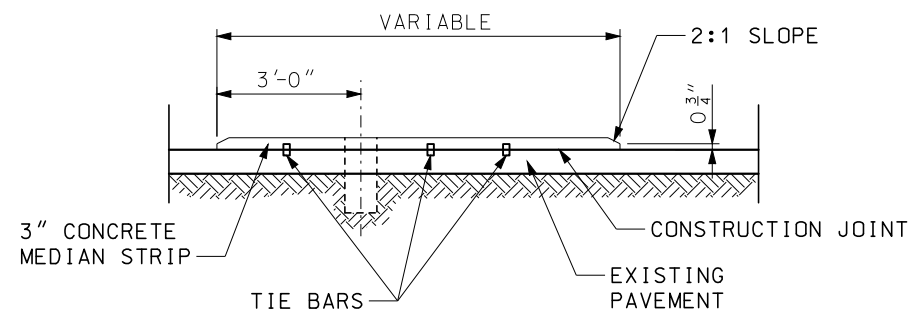
SHOULDER TAPER TREATMENT

DETAIL A



ISLAND DETAIL

ISLAND WILL BE PAID FOR AS CONCRETE MEDIAN STRIP.



LOW PROFILE ISLAND DETAIL

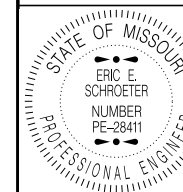
DETAIL B

GENERAL NOTES:  
FOR DETAILS ON CONCRETE MEDIAN STRIP CONSTRUCTION, SEE STANDARD  
PLAN 608.30.



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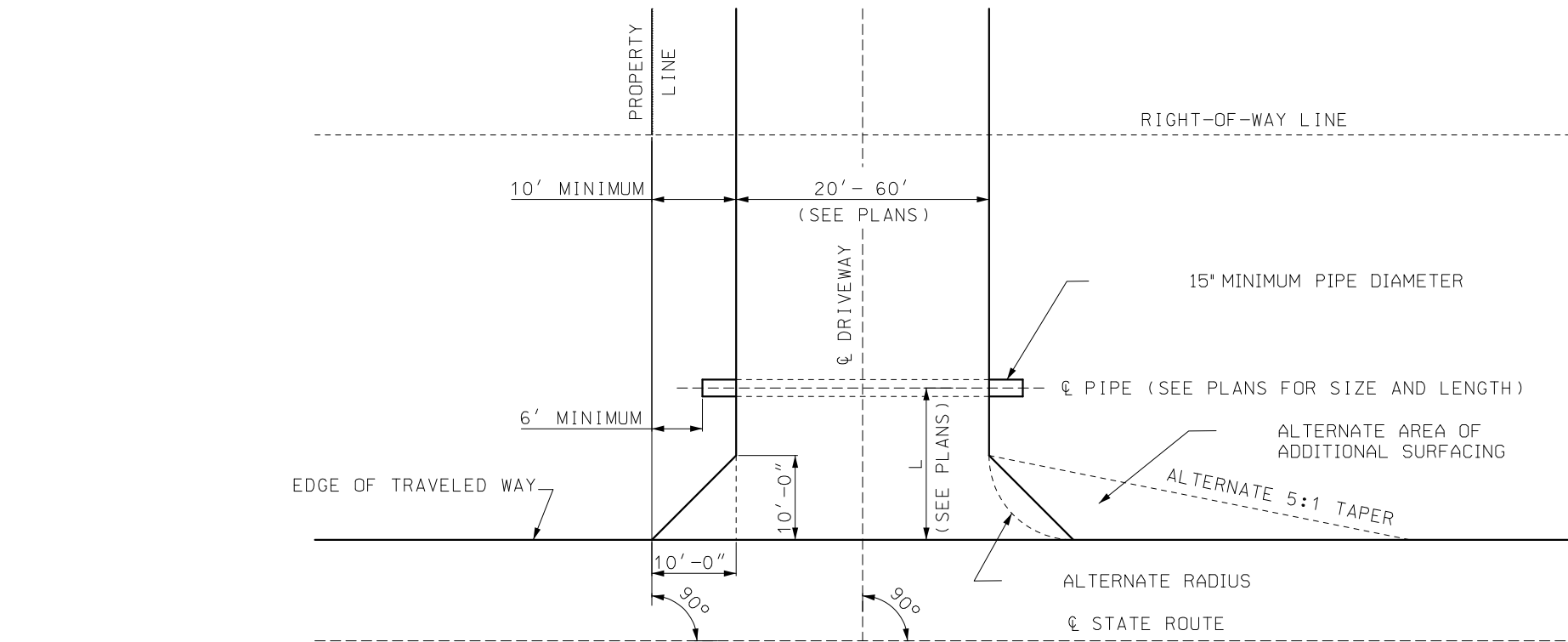
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## TYPICAL MEDIAN OPENING DIVIDED HIGHWAYS

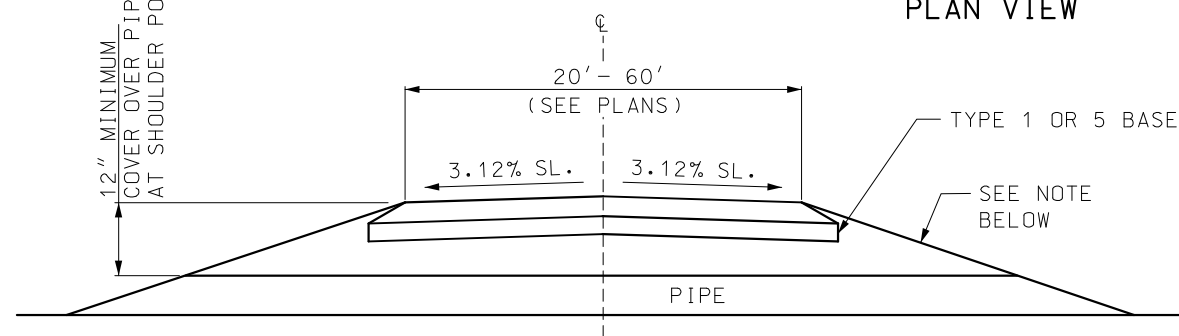
DATE EFFECTIVE: 04/01/2016  
DATE PREPARED: 2/11/2016

**203.50N**

SHEET NO.  
2 OF 2



PLAN VIEW



DRIVEWAY TYPICAL SECTION

DRIVEWAY SIDE SLOPES: \*

1 TO 1700 VEHICLES PER DAY ON STATE ROUTE USE 3:1 SLOPE (OR 6:1 SLOPE WHERE PRACTICABLE).

OVER 1700 VEHICLES PER DAY ON STATE ROUTE USE 6:1 SLOPE (OR FLATTER WHERE PRACTICABLE).

NOTE: RECOMMENDED WIDTH OF DRIVEWAY - 20'

\* IN ORDER TO MINIMIZE THE USE OF 6:1 SLOPED END PIPE SECTIONS ON NEW CONSTRUCTION AND WHERE POSSIBLE ON EXISTING ROUTES, THE LOCATION OF DRAINAGE PIPE SHOULD BE BEYOND THE CLEAR ZONE DISTANCE AS SHOWN IN TABLE 3.1 OF THE 1988 EDITION OF "ROADSIDE DESIGN GUIDE".

GENERAL NOTES:

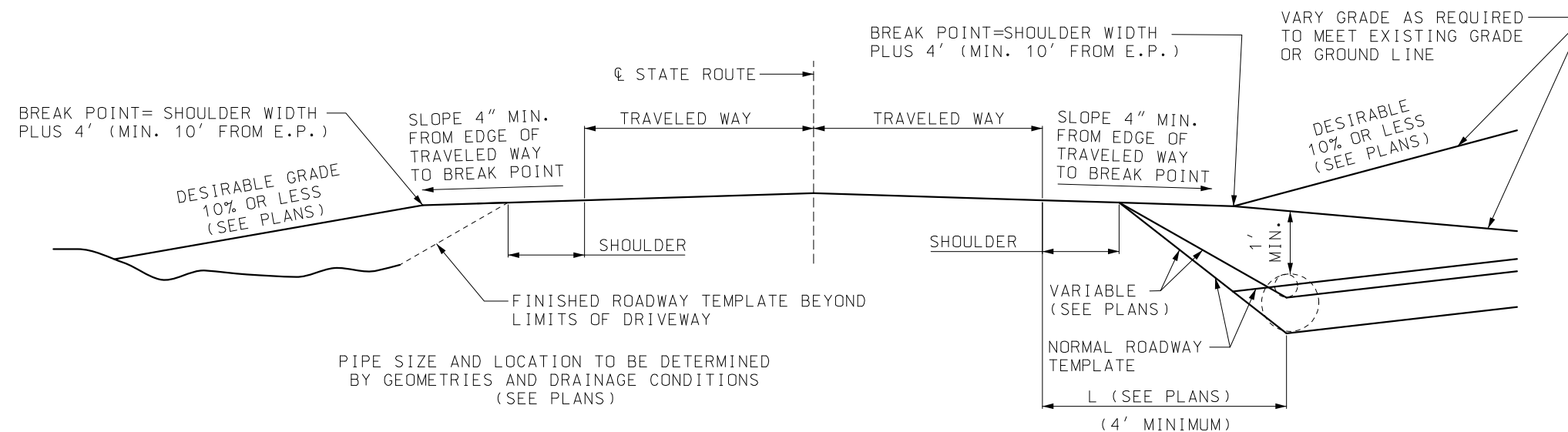
NO PART OF THE DRIVEWAY EXCLUDING TAPERS SHALL BE CONSTRUCTED BEYOND THE PROPERTY FRONTAGE.

SURFACING SHALL BE AS SHOWN ON THE PLANS OR PERMIT.

4 INCHES OF TYPE 1 OR 5 BASE SHALL BE PLACED AND COMPACTED BENEATH THE AREAL SURFACE OF CONCRETE AND ASPHALT DRIVEWAYS.

LENGTH OF PIPE SHALL BE DETERMINED BY DEPTH AND LOCATION OF DITCH. (MINIMUM 32' LENGTH OF MINIMUM 15" DIAMETER PIPE), SEE PLANS.

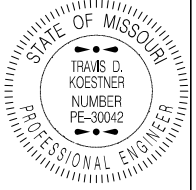
THIS DRAWING ILLUSTRATES DRIVEWAY DETAILS FOR MINIMUM SITUATIONS. TRAFFIC VOLUMES, SAFETY CONSIDERATIONS, LOCAL REQUIREMENTS, ETC., MAY DICTATE MORE EXTENSIVE IMPROVEMENTS THAN ILLUSTRATED.

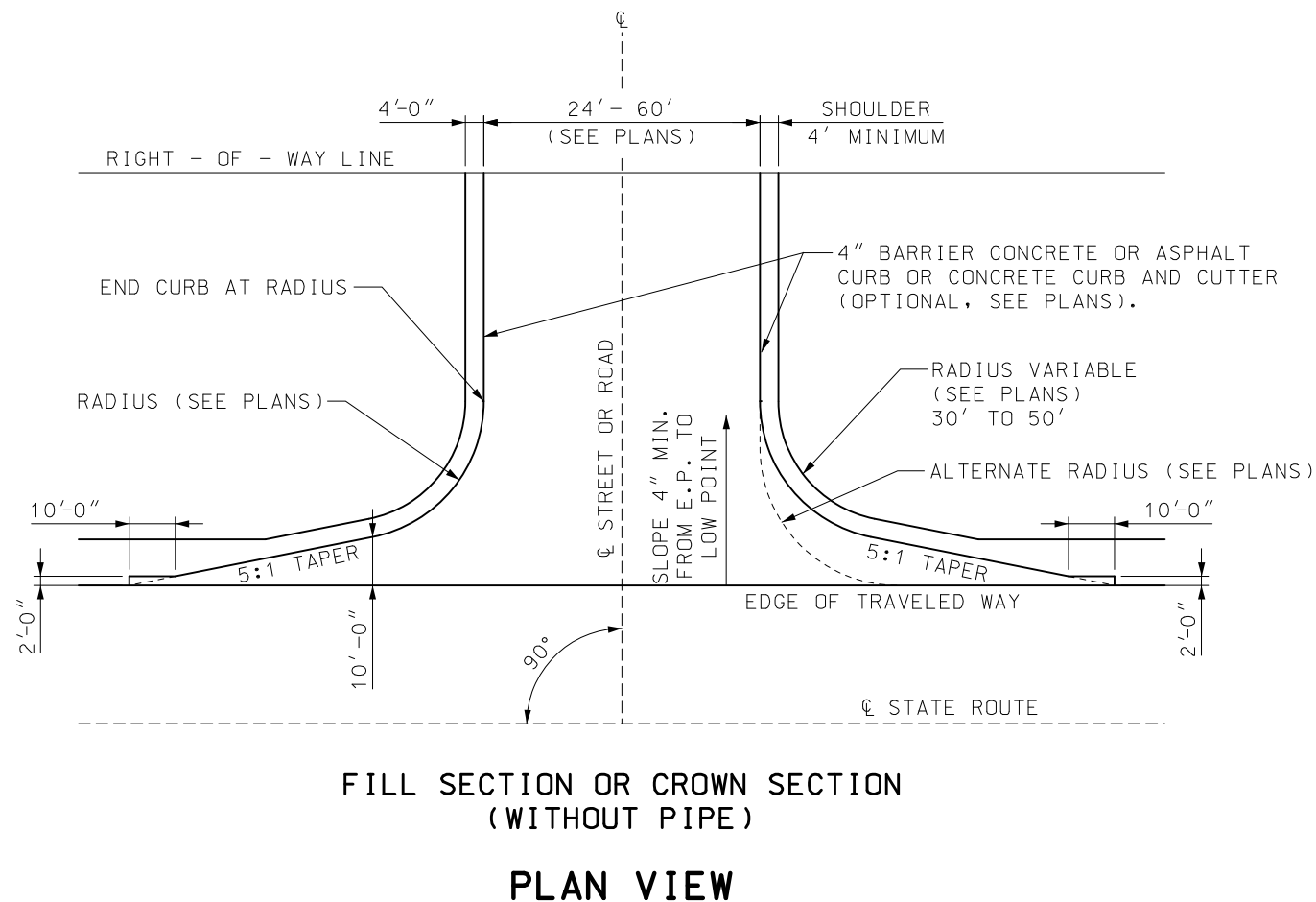
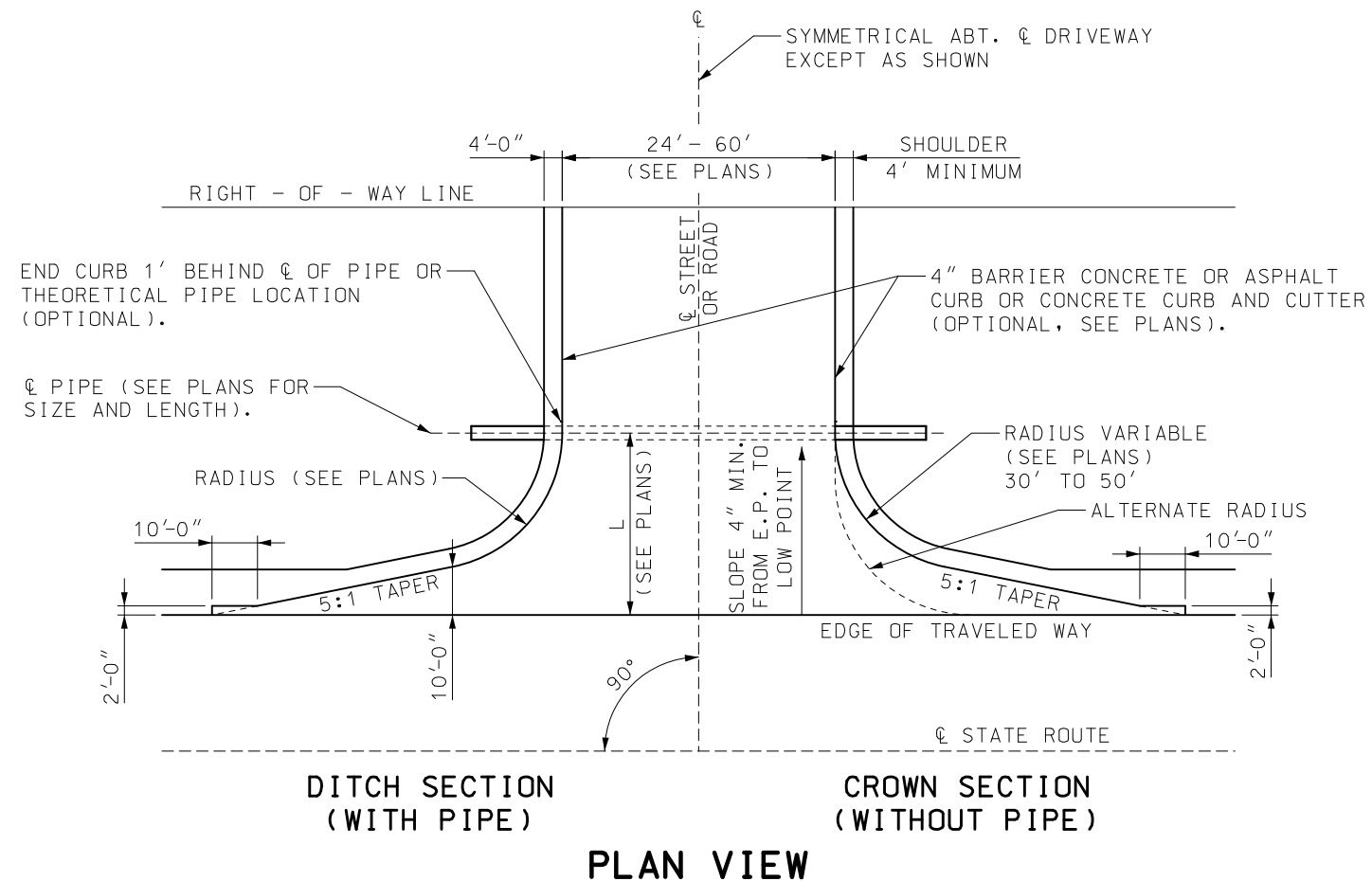


IN FILLS

IN CUTS

PROFILE VIEW

|                                                                                                                                                                                                                                  |                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                  |
|                                                                                                                                             | <b>DRIVEWAY</b><br><b>TYPE I</b> |
| DATE EFFECTIVE: 07/01/2020<br>DATE PREPARED: 4/29/2020                                                                                                                                                                           | <b>203.61B</b>                   |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                  |



#### GENERAL NOTES:

RECOMMENDED WIDTH OF ROADWAY - 24' WITHOUT PARKING ON ROAD AND 32' WITH PARKING ON ROAD.

SURFACING SHALL BE AS SHOWN ON THE PLANS OR PERMIT.

4 INCHES OF TYPE 1 OF 5 BASE SHALL BE PLACED AND COMPACTED BENEATH THE AREAL SURFACE OF ASPHALT AND CONCRETE DRIVEWAYS.

LENGTH OF PIPE SHALL BE DETERMINED BY DEPTH AND LOCATION OF DITCH, (SEE PLANS).

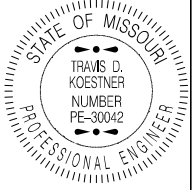
IF A PAVED APPROACH IS REQUIRED, REFER TO STANDARD PLANS 608.00 FOR CONSTRUCTION DETAILS AND CONSTRUCT CURB (IF REQUIRED) TO MEET CURB ON PAVED APPROACH, TRANSITION REQUIRED FROM 4" CURB TO 6" CURB.

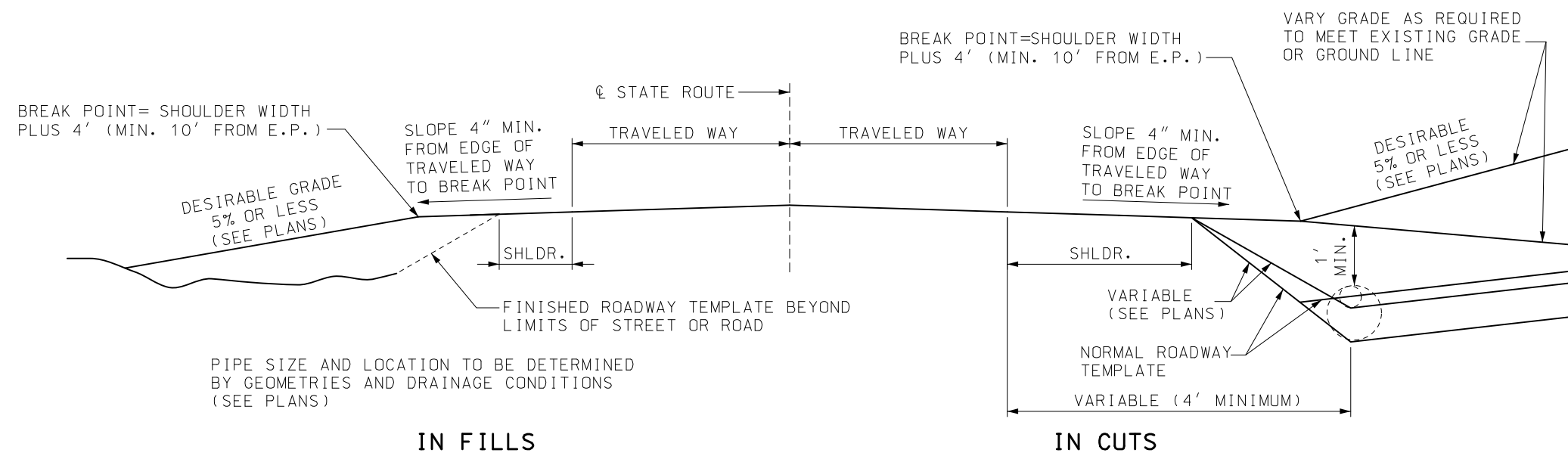
CURB OR CURB AND GUTTER BETWEEN RIGHT-OF-WAY LINE AND PIPE MAY MEET LOCAL AGENCY STANDARDS.

THIS DRAWING ILLUSTRATES DETAILS FOR MINIMUM SITUATIONS. TRAFFIC VOLUMES, SAFETY CONSIDERATIONS, DRAINAGE CONSIDERATIONS, LOCAL REQUIREMENTS, ETC., MAY DICTATE MORE EXTENSIVE IMPROVEMENTS THAN ILLUSTRATED.

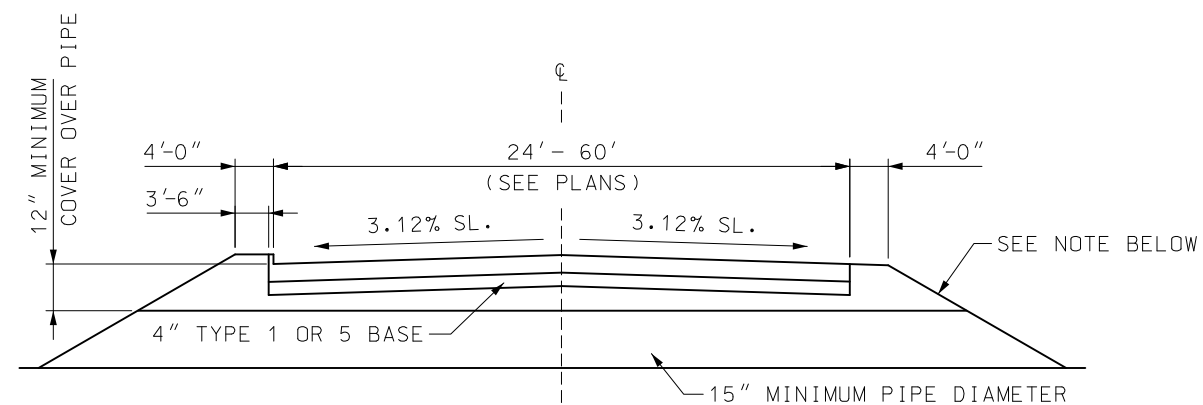
PIPE SIZE AND LOCATION TO BE DETERMINED BY GEOMETRICS AND DRAINAGE CONDITIONS (SEE PLANS).

A MINIMUM 100-FOOT SIGHT DISTANCE TRIANGLE, MEASURED ALONG THE CENTERLINE OF THE INTERSECTING ROADWAYS, SHOULD BE PROVIDED.

|                                                                                                                                                                                                                                  |                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                             |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>DRIVEWAY<br/>TYPE II</b> |
| DATE EFFECTIVE: 07/01/2020<br>DATE PREPARED: 4/29/2020                                                                                                                                                                           | <b>203.62E</b>              |
| SHEET NO.<br>1 OF 2                                                                                                                                                                                                              |                             |



## PROFILE



WITH CURB  
DRIVEWAY TYPICAL SECTION

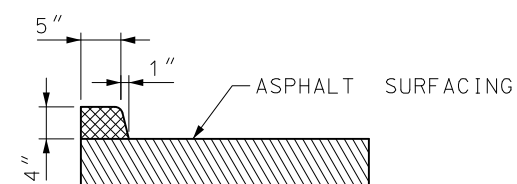
WITHOUT CURB

DRIVEWAY SIDE SLOPES: \*

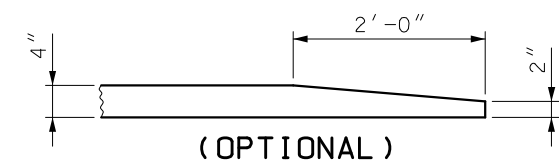
1 TO 1700 VEHICLES PER DAY ON STATE ROUTE USE 3:1 SLOPE (OR 6:1 SLOPE WHERE PRACTICABLE).

OVER 1700 VEHICLES PER DAY ON STATE ROUTE USE 6:1 SLOPE (OR FLATTER WHERE PRACTICABLE).

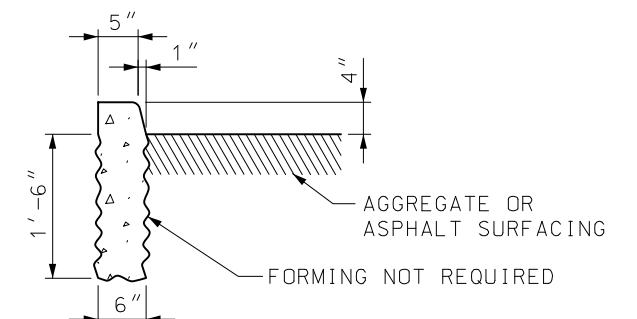
\* IN ORDER TO MINIMIZE THE USE OF 6:1 SLOPED END PIPE SECTIONS ON NEW CONSTRUCTION AND WHERE POSSIBLE ON EXISTING ROUTES, THE LOCATION OF DRAINAGE PIPE SHOULD BE BEYOND THE CLEAR ZONE DISTANCE AS SHOWN IN TABLE 3.1 OF THE "ROADSIDE DESIGN GUIDE".



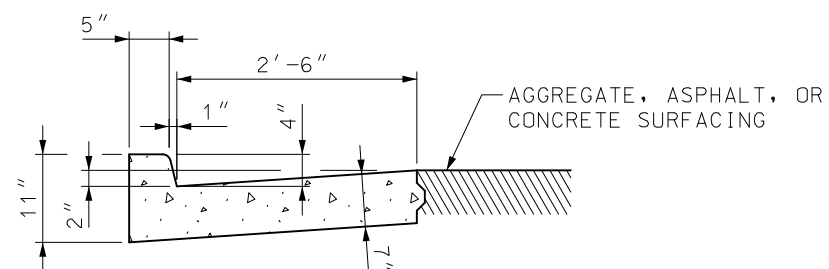
SECTION THRU 4" ASPHALT CURB



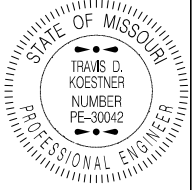
(OPTIONAL)  
CURB TERMINUS  
DETAIL



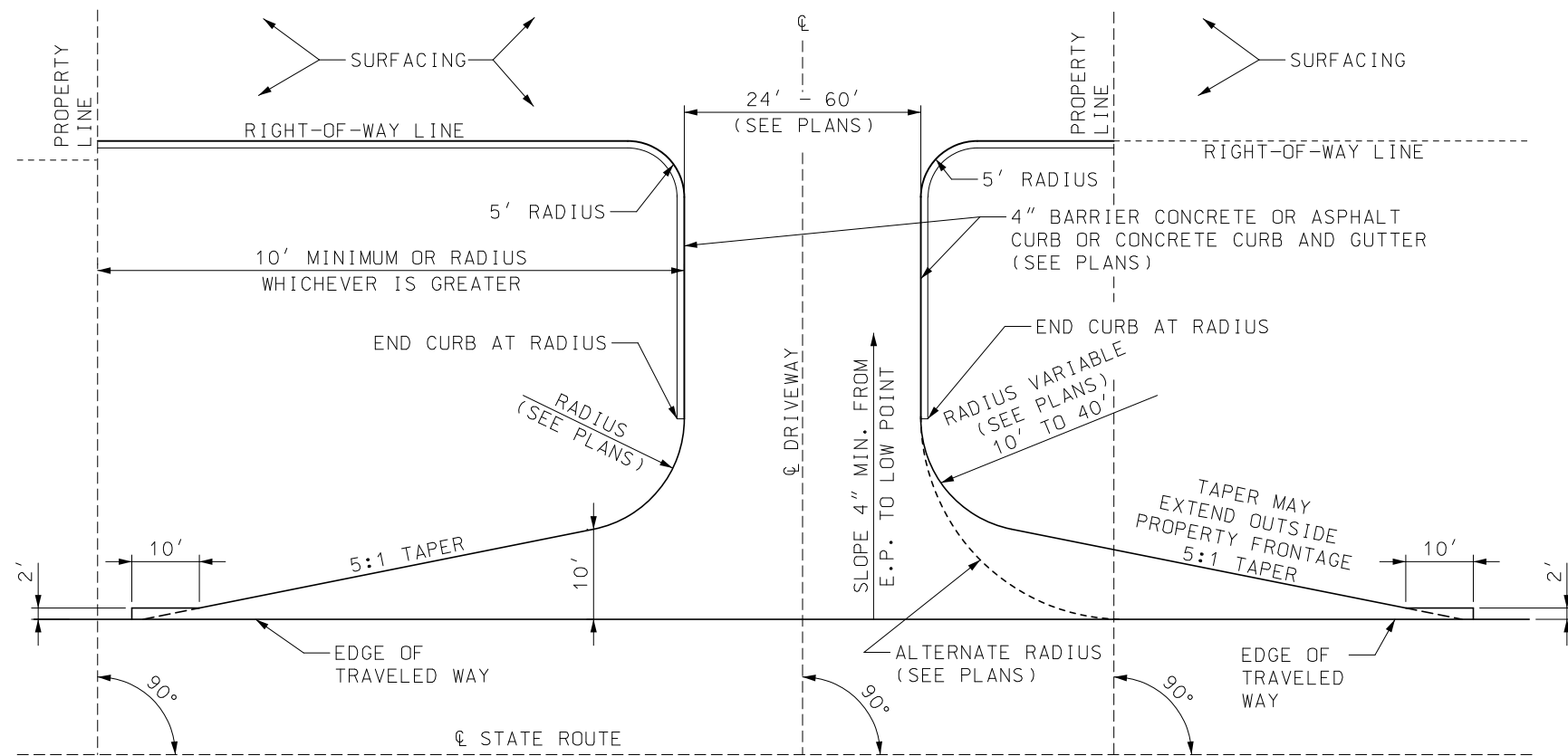
SECTION THRU 4" BARRIER CURB



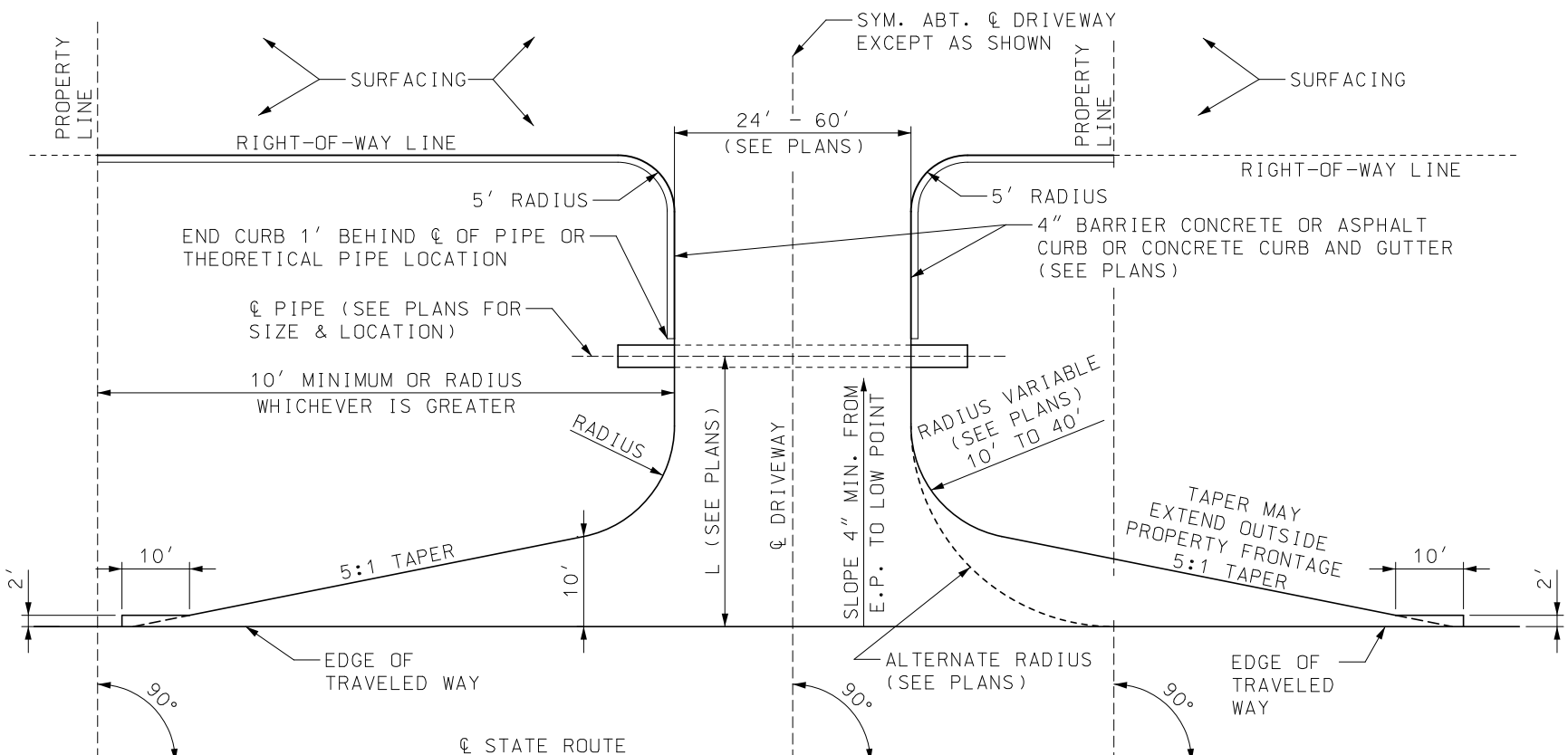
SECTION THRU CONCRETE  
CURB AND GUTTER

|                                                                                                                                                                                                                                  |                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                             |
|                                                                                                                                             | <b>DRIVEWAY<br/>TYPE II</b> |
| DATE EFFECTIVE: 07/01/2020<br>DATE PREPARED: 4/29/2020                                                                                                                                                                           | <b>203.62E</b>              |
| SHEET NO.<br>2 OF 2                                                                                                                                                                                                              |                             |





FILL SECTION OR CROWN SECTION  
(WITHOUT PIPE)  
PLAN VIEW



DITCH SECTION  
(WITH PIPE)  
PLAN VIEW

GENERAL NOTES:

FOR LIGHT DUTY PAVEMENT (<3500 ADT) DRIVEWAY BEGINS AT EDGE OF PAVEMENT.

RECOMMENDED WIDTH OF DRIVEWAY - 40'. SKETCH OR PLAN REQUIRED.

NO PART OF THE DRIVEWAY EXCLUDING TAPERS SHALL BE CONSTRUCTED OUTSIDE OF THE PROPERTY FRONTAGE.

SURFACING SHALL BE AS SHOWN ON THE PLANS OR PERMIT.

4 INCHES OF TYPE 1 OR 5 BASE SHALL BE PLACED AND COMPACTED BENEATH THE AREAL SURFACE OF CONCRETE AND ASPHALT DRIVEWAYS.

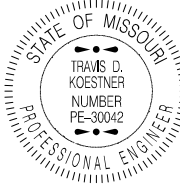
LENGTH OF PIPE SHALL BE DETERMINED BY DEPTH AND LOCATION OF DITCH, (SEE PLANS).

IF A PAVED APPROACH IS REQUIRED, REFER TO STANDARD PLAN 608.00 FOR CONSTRUCTION DETAILS AND CONSTRUCT CURB (IF REQUIRED) TO MEET CURB ON PAVED APPROACH. TRANSITION REQUIRED FROM 4" CURB TO 6" CURB.

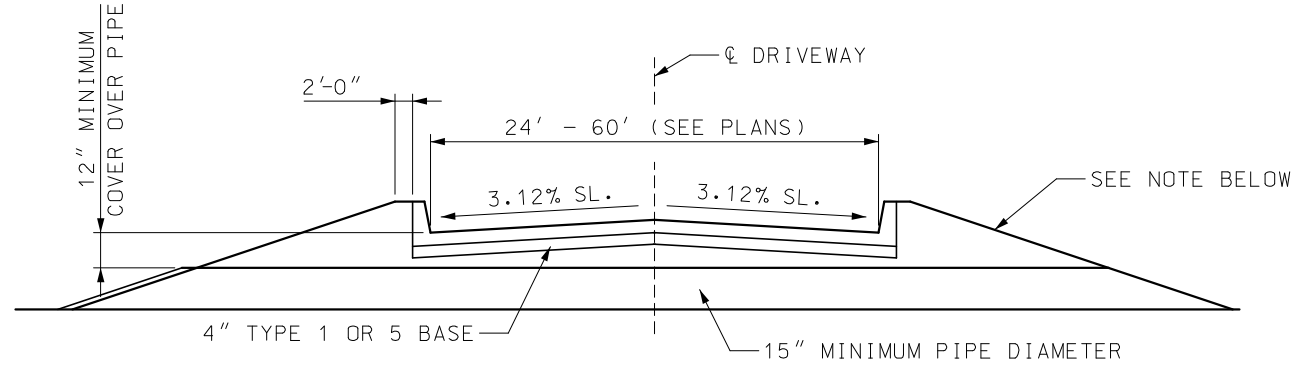
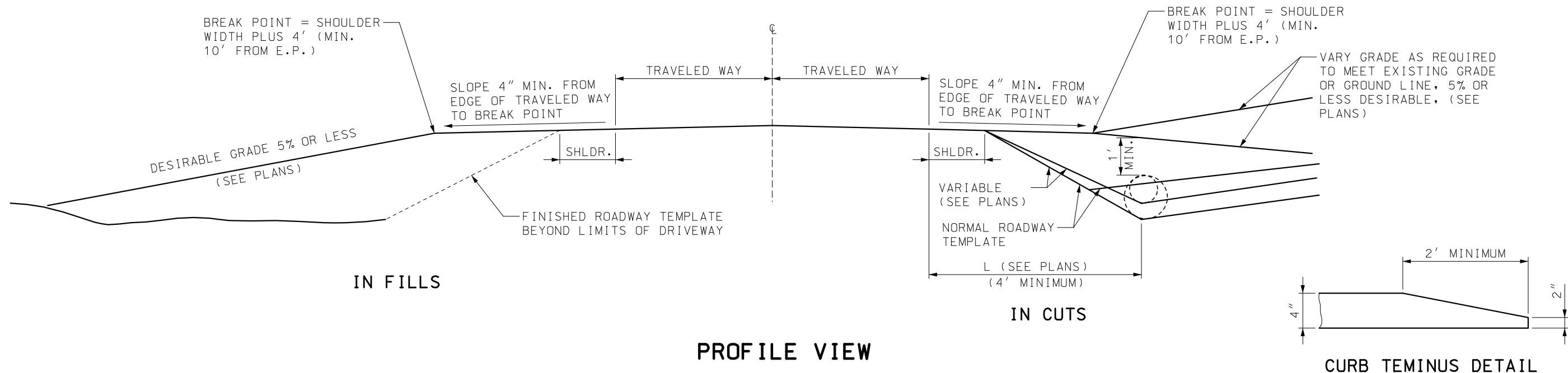
CURB OR CURB AND GUTTER BETWEEN RIGHT-OF-WAY LINE AND PIPE MAY MEET LOCAL AGENCY STANDARDS.

PIPE SIZE AND LOCATION TO BE DETERMINED BY GEOMETRICS AND DRAINAGE CONDITIONS (SEE PLANS).

THIS DRAWING ILLUSTRATES DRIVEWAY DETAILS FOR MINIMUM SITUATIONS. TRAFFIC VOLUMES, SAFETY CONSIDERATIONS, DRAINAGE CONSIDERATIONS, LOCAL REQUIREMENTS, ETC., MAY DICTATE MORE EXTENSIVE IMPROVEMENTS THAN ILLUSTRATED.

|                                                                                                                                                                                                                                                                 |                                                        |                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                |                                                        |                |
|  <p>STATE OF MISSOURI<br/>TRAVIS D. KOESTNER<br/>NUMBER PE-30042<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <b>DRIVEWAY<br/>TYPE III</b>                           |                |
|                                                                                                                                                                                                                                                                 | DATE EFFECTIVE: 07/01/2020<br>DATE PREPARED: 4/29/2020 | <b>203.63C</b> |

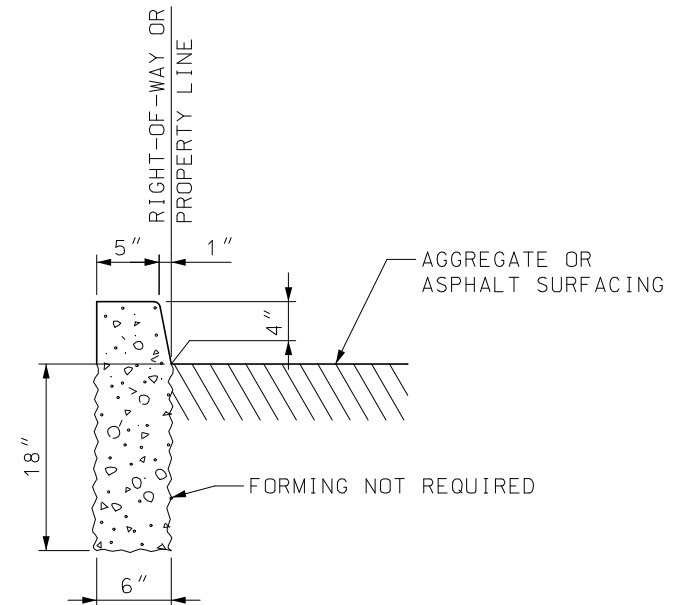
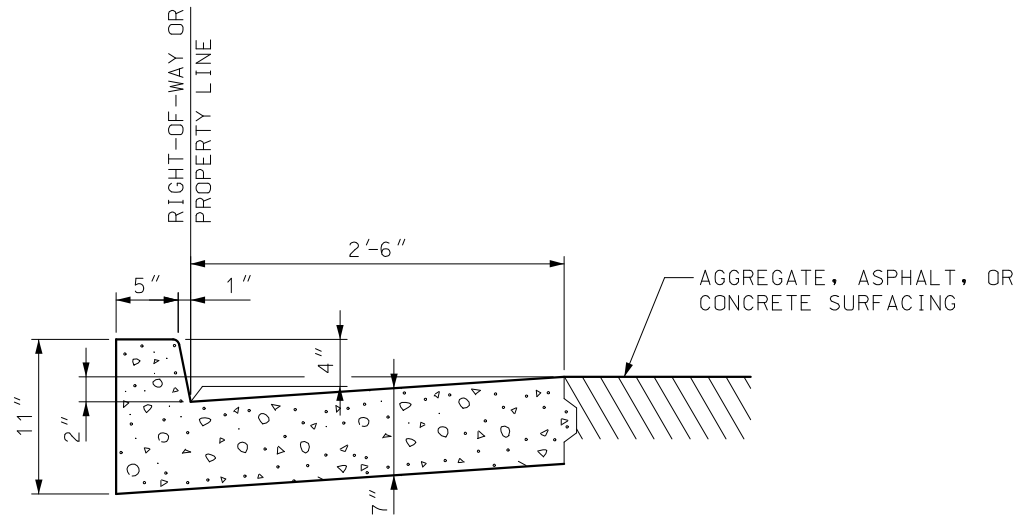
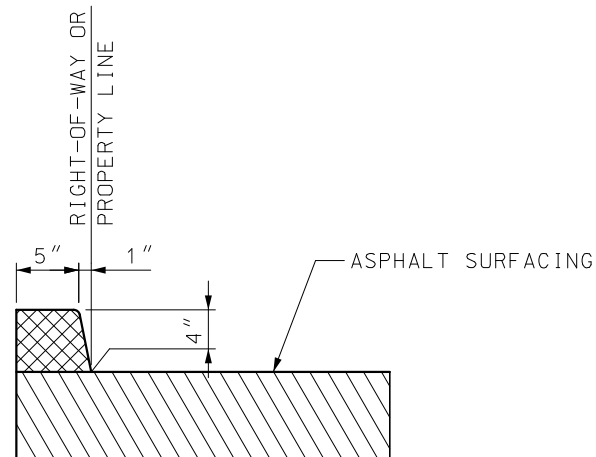
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



DRIVEWAY SIDE SLOPES: \*

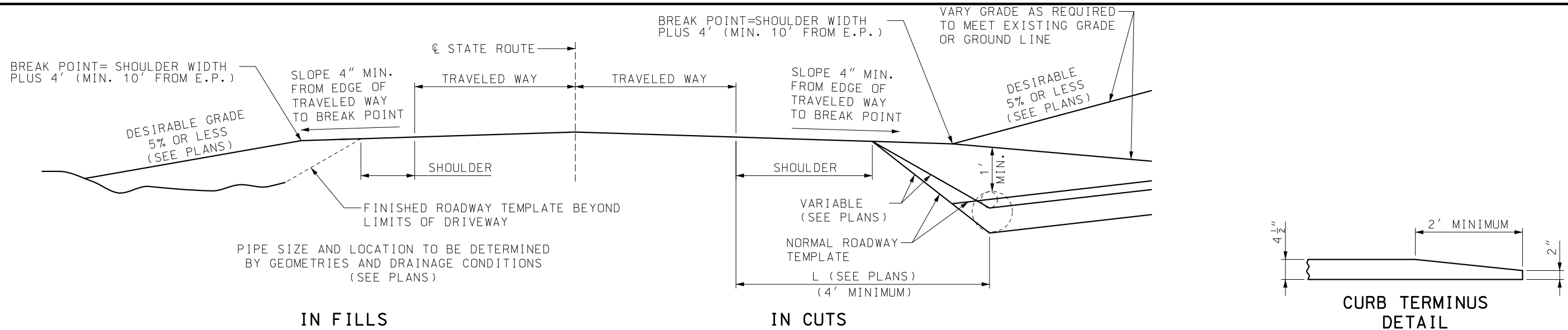
1 TO 1700 VEHICLES PER DAY ON STATE ROUTE USE 3:1 SLOPE (OR 6:1 WHERE PRACTICABLE).  
OVER 1700 VEHICLES PER DAY ON STATE ROUTE USE 6:1 SLOPE (OR FLATTER WHERE PRACTICABLE).

\* IN ORDER TO MINIMIZE THE USE OF 6:1 SLOPED END PIPE SECTIONS ON NEW CONSTRUCTION AND WHERE POSSIBLE ON EXISTING ROUTES, THE LOCATION OF THE DRAINAGE PIPE SHOULD BE BEYOND THE CLEAR ZONE DISTANCE AS SHOWN IN TABLE 3.1 OF THE "ROADSIDE DESIGN GUIDE".

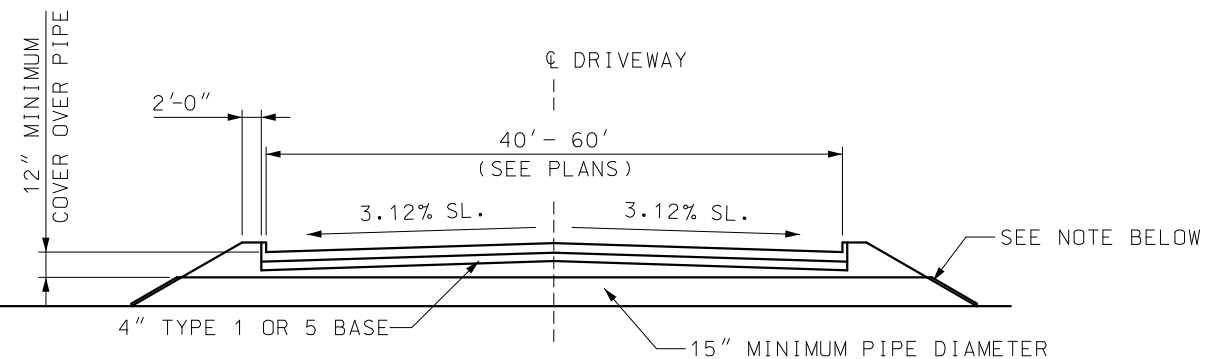
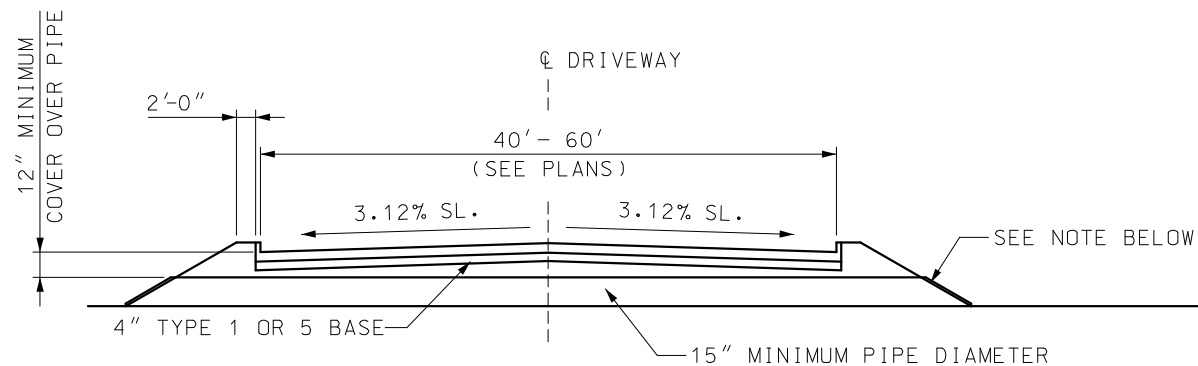


|                                                                                                                                            |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                          |
|                                                                                                                                            | <b>DRIVEWAY TYPE III</b> |
| DATE EFFECTIVE: 07/01/2020<br>DATE PREPARED: 4/29/2020                                                                                     | <b>203.63C</b>           |
| SHEET NO. 2 OF 2                                                                                                                           |                          |





PROFILE



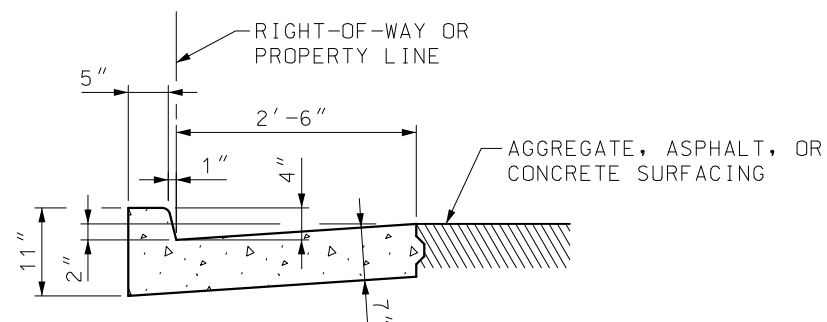
DRIVEWAY TYPICAL SECTION

DRIVEWAY SIDE SLOPES: \*

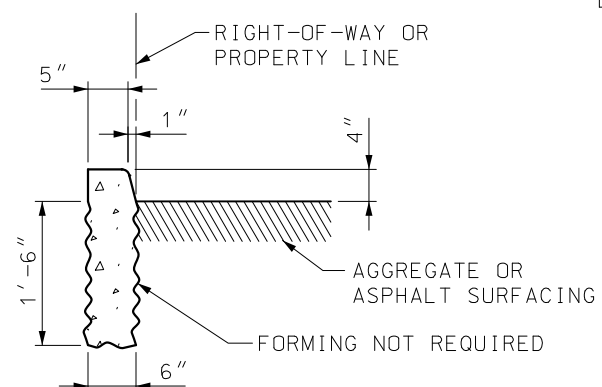
1 TO 1700 VEHICLES PER DAY ON STATE ROUTE USE 3:1 SLOPE (OR 6:1 SLOPE WHERE PRACTICABLE).

OVER 1700 VEHICLES PER DAY ON STATE ROUTE USE 6:1 SLOPE (OR FLATTER WHERE PRACTICABLE).

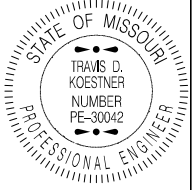
\* IN ORDER TO MINIMIZE THE USE OF 6:1 SLOPE AND PIPE SECTIONS ON NEW CONSTRUCTION OF DRAINAGE PIPE SHOULD BE BEYOND THE CLEAR ZONE DISTANCE AS SHOWN IN TABLE 3.1 OF THE "ROADSIDE DESIGN GUIDE".

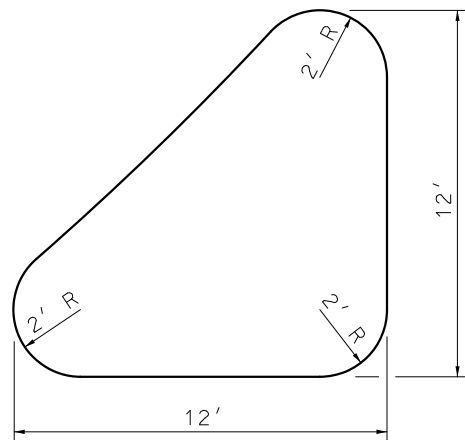


SECTION THRU CONCRETE CURB AND GUTTER



SECTION THRU 4" BARRIER CURB

|                                                                                                                                                                                                                                  |                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                |
|                                                                                                                                             | <p><b>DRIVEWAY TYPE IV</b></p> |
| DATE EFFECTIVE: 07/01/2020<br>DATE PREPARED: 4/29/2020                                                                                                                                                                           | <p><b>203.64E</b></p>          |
| SHEET NO. 2 OF 2                                                                                                                                                                                                                 |                                |



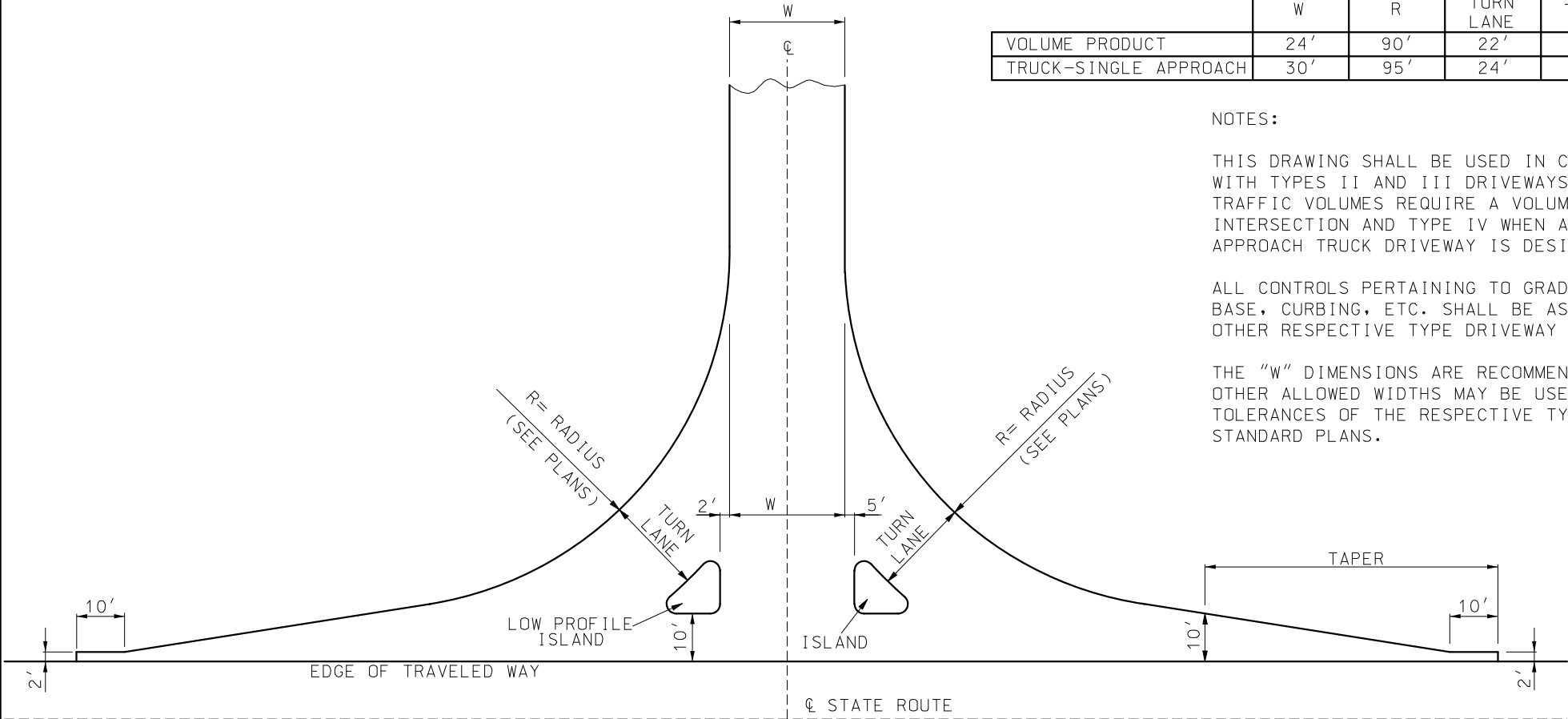
NOTE:  
SEE STANDARD PLAN 203.50 FOR DETAILS OF LOW PROFILE ISLAND.  
WHERE MINIMUM ISLAND CANNOT BE OBTAINED, OMIT ISLAND.

MINIMUM ISLAND DETAILS

|                       | W   | R   | MIN. TURN LANE | TAPER |
|-----------------------|-----|-----|----------------|-------|
| VOLUME PRODUCT        | 24' | 90' | 22'            | 5:1   |
| TRUCK-SINGLE APPROACH | 30' | 95' | 24'            | 5:1   |

NOTES:  
THIS DRAWING SHALL BE USED IN CONJUNCTION WITH TYPES II AND III DRIVEWAYS WHEN TRAFFIC VOLUMES REQUIRE A VOLUME PRODUCT INTERSECTION AND TYPE IV WHEN A SINGLE APPROACH TRUCK DRIVEWAY IS DESIRED.  
ALL CONTROLS PERTAINING TO GRADES, DRAINAGE, BASE, CURBING, ETC. SHALL BE AS SHOWN ON OTHER RESPECTIVE TYPE DRIVEWAY STANDARD PLANS.  
THE "W" DIMENSIONS ARE RECOMMENDED WIDTH. OTHER ALLOWED WIDTHS MAY BE USED WITHIN TOLERANCES OF THE RESPECTIVE TYPE DRIVEWAY STANDARD PLANS.

GENERAL NOTES:  
DETAILS SHOWN ON THIS SHEET ARE FOR RIGHT ANGLE APPROACHES.  
TAPER LENGTHS ARE NOT APPLICABLE WHEN DECELERATION LANES ARE PROVIDED.  
SIGNALIZED INTERSECTIONS AND INTERSECTIONS IN DEVELOPED AREAS MAY BE MODIFIED TO MEET EXISTING CONDITIONS.  
THIS DRAWING ILLUSTRATES DRIVEWAY DETAILS FOR MINIMUM SITUATIONS. TRAFFIC VOLUMES, SAFETY CONSIDERATIONS, DRAINAGE CONSIDERATIONS, LOCAL REQUIREMENTS, ETC., MAY DICTATE MORE EXTENSIVE IMPROVEMENTS THAN ILLUSTRATED.



PLAN VIEW



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

TRAVIS D. KOESTNER

NUMBER PE-30042

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DRIVEWAY  
TYPE V

DATE EFFECTIVE: 07/01/2020

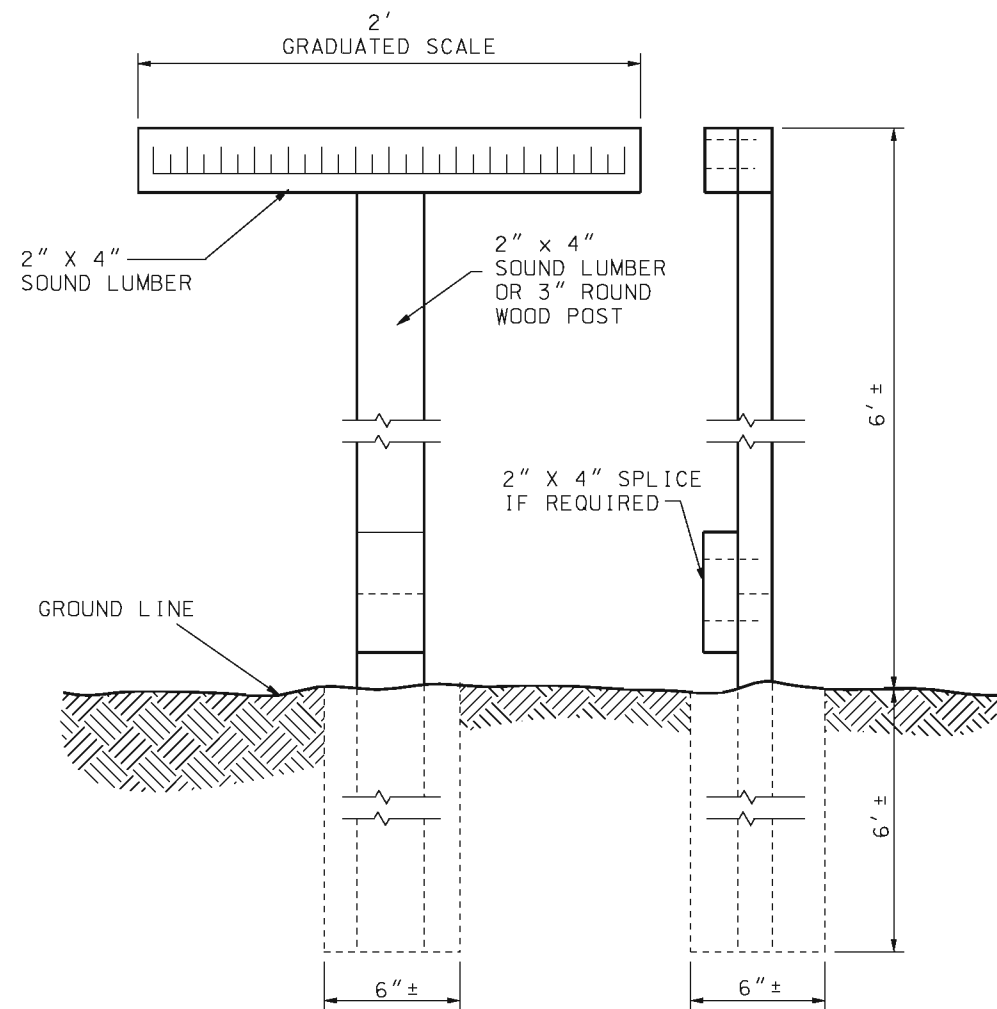
DATE PREPARED: 4/29/2020

203.65B

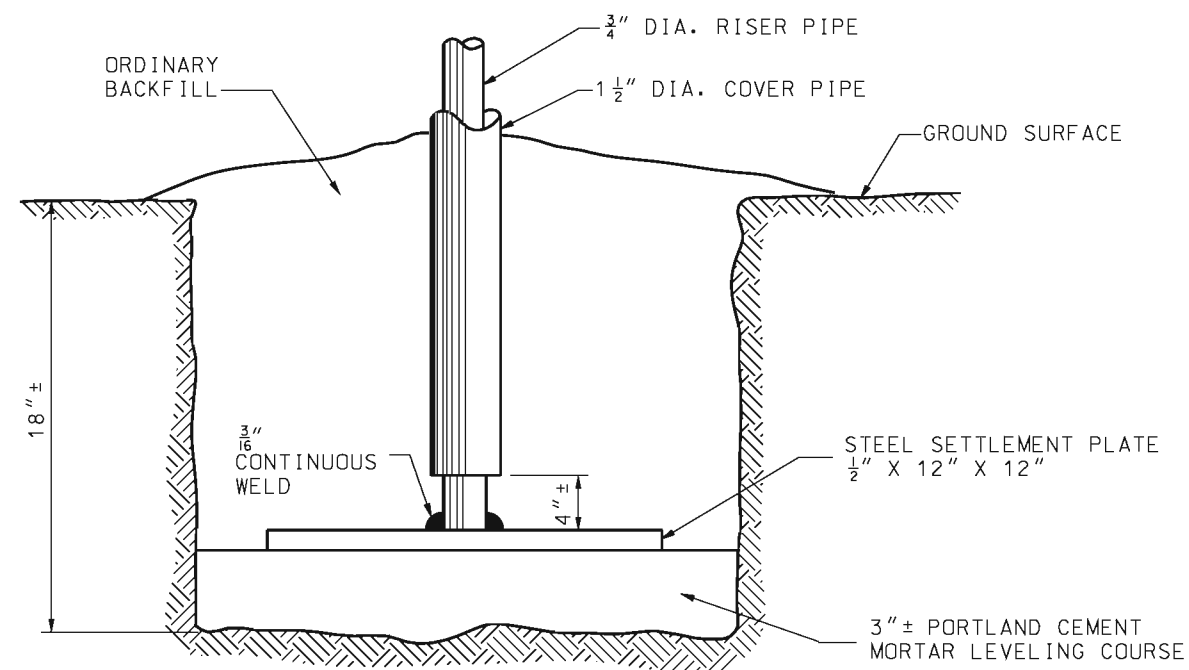
SHEET NO.

1 OF 1

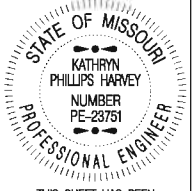
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



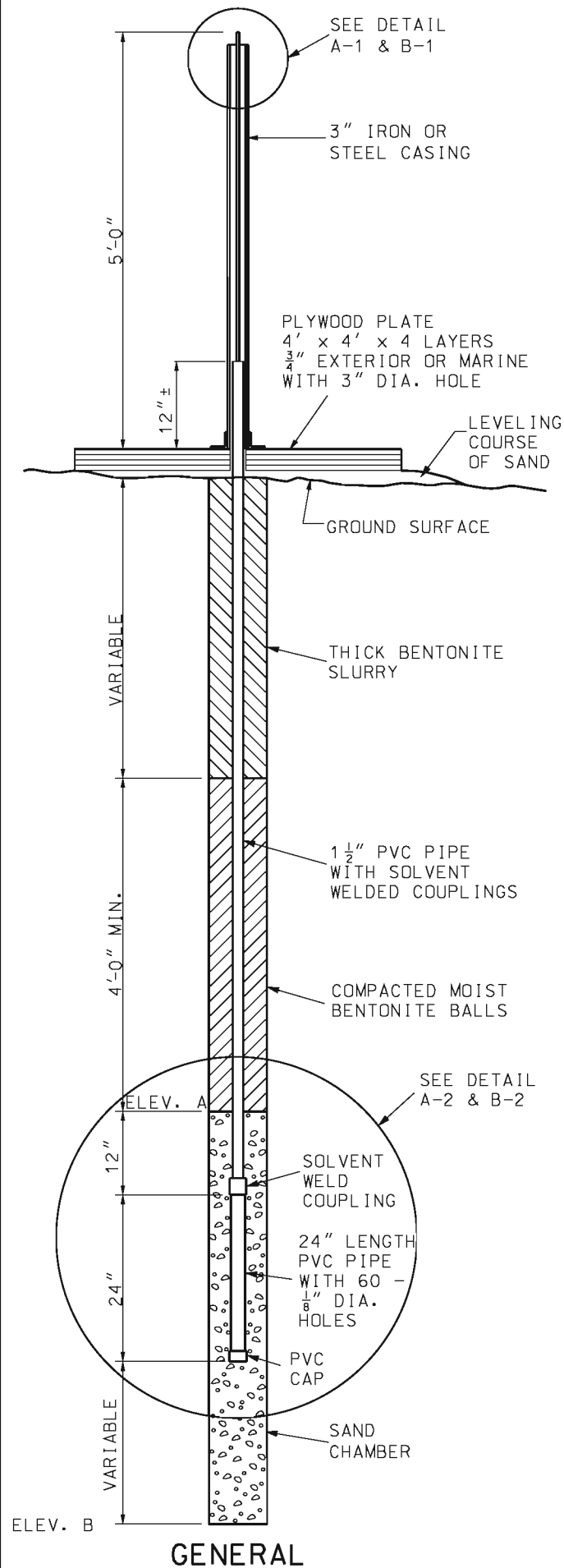
**EMBANKMENT CONTROL STAKE**



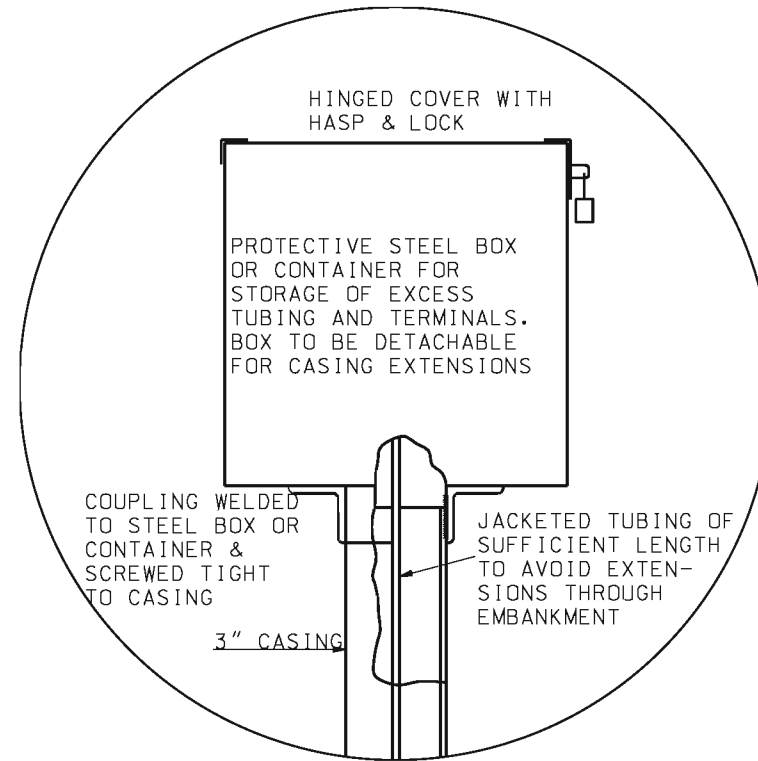
**SETTLEMENT GAUGE**

|                                                                                                                                                                                                                                  |                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                       |
|                                                                                                                                             | <p align="center"><b>EMBANKMENT CONTROL</b><br/>MEASURING DEVICES</p> |
| DATE EFFECTIVE: 04/01/1983<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <p align="center"><b>204.00D</b></p>                                  |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                                                       |

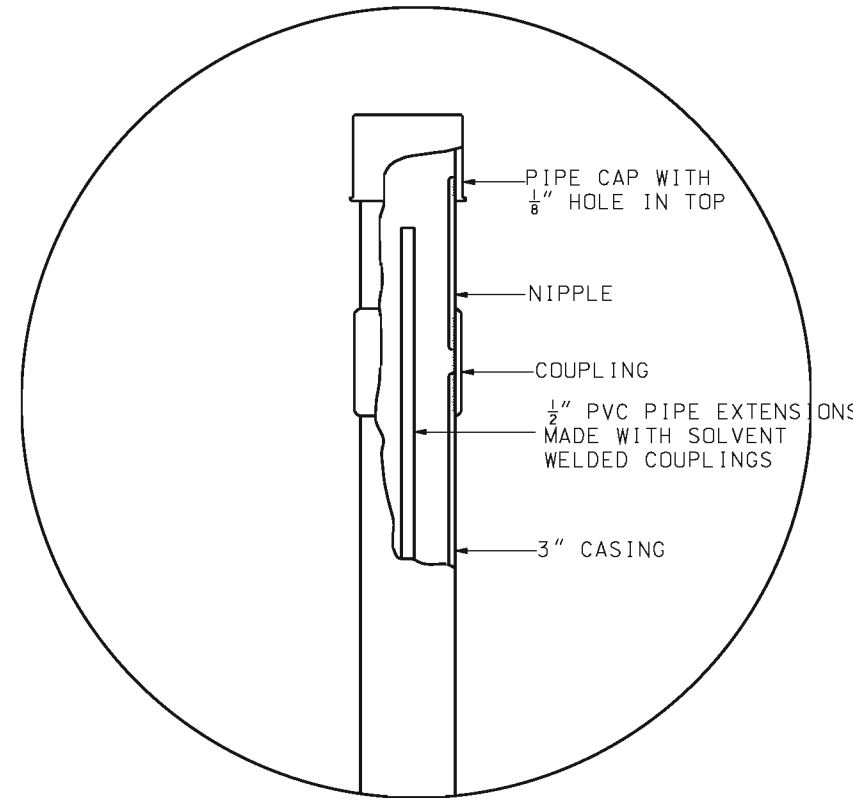
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



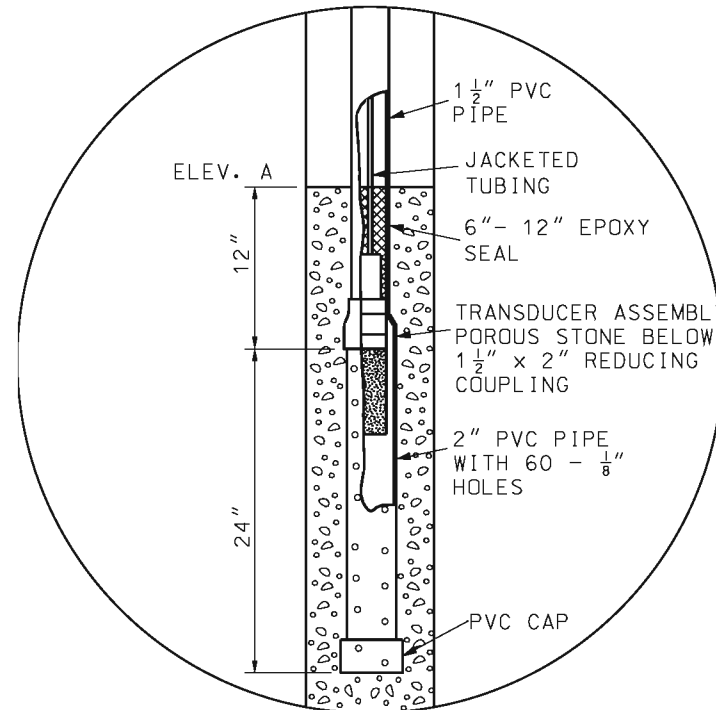
GENERAL



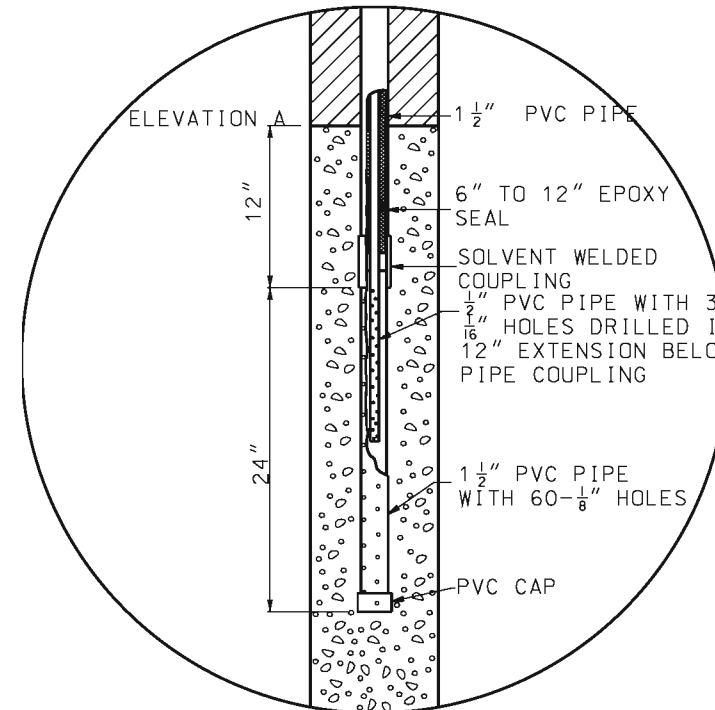
DETAIL A-1



DETAIL B-1



DETAIL A-2  
TYPE A



DETAIL B-2  
TYPE B

GENERAL NOTES:

FOR ELEVATION A AND ELEVATION B STATION, LOCATIONS  
AND EMBANKMENT CONTROL LIMITS, SEE ROADWAY PLANS.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



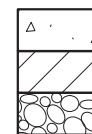
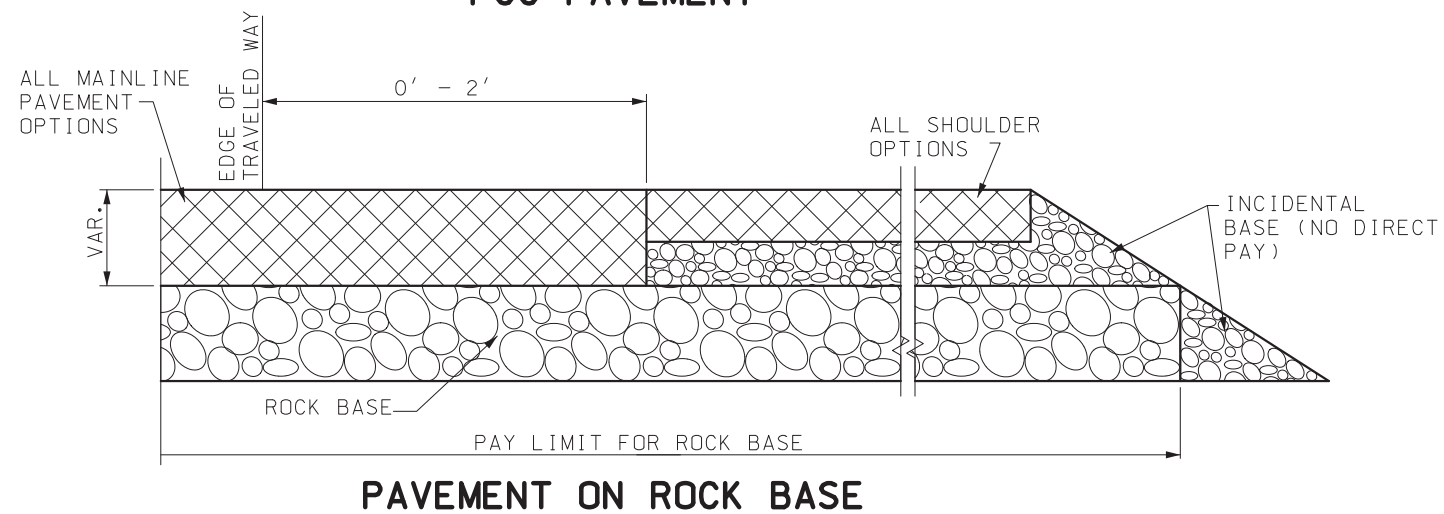
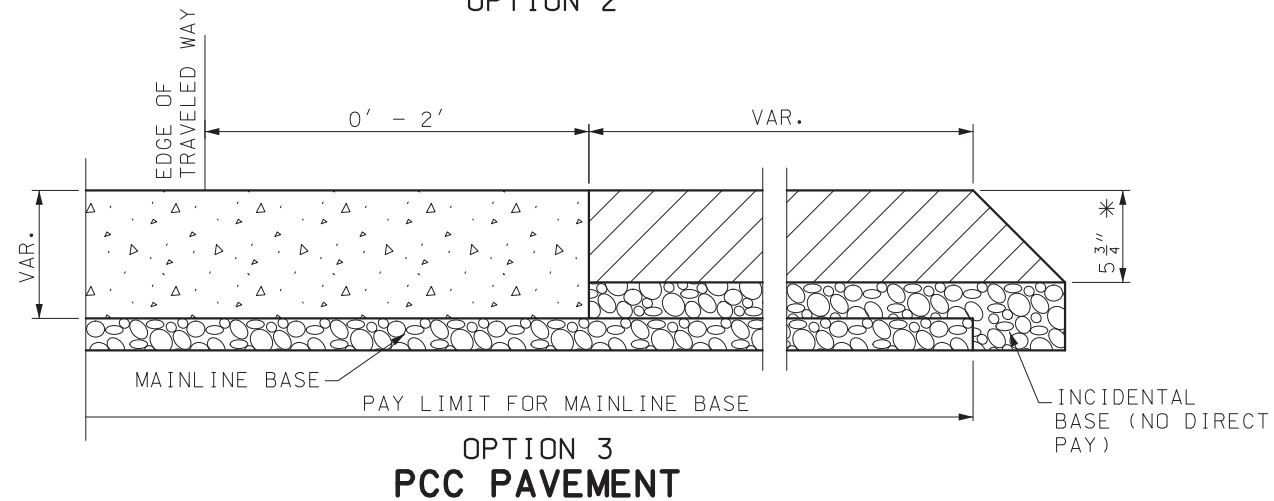
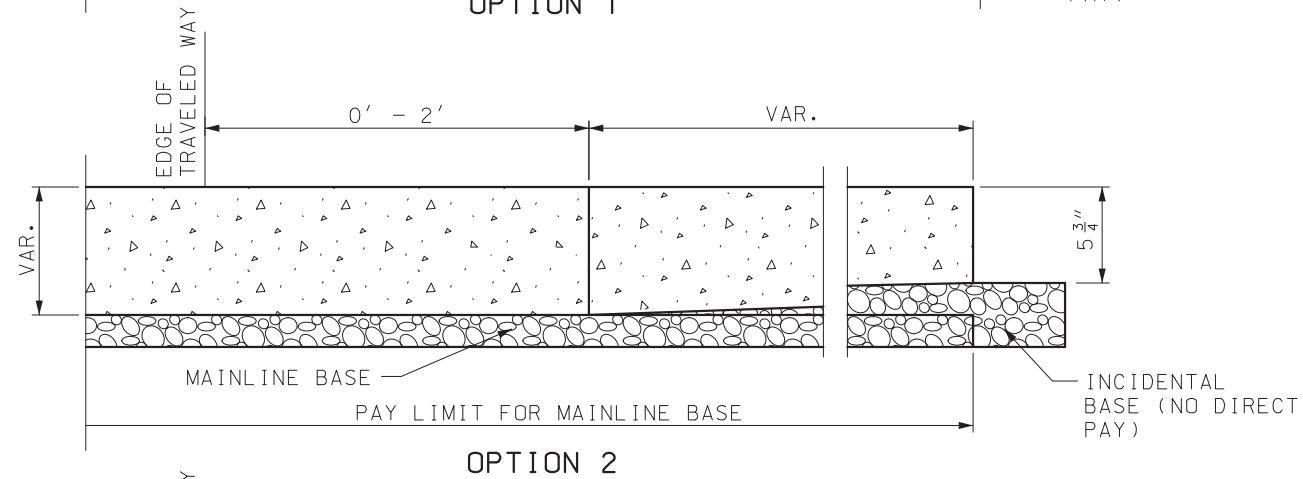
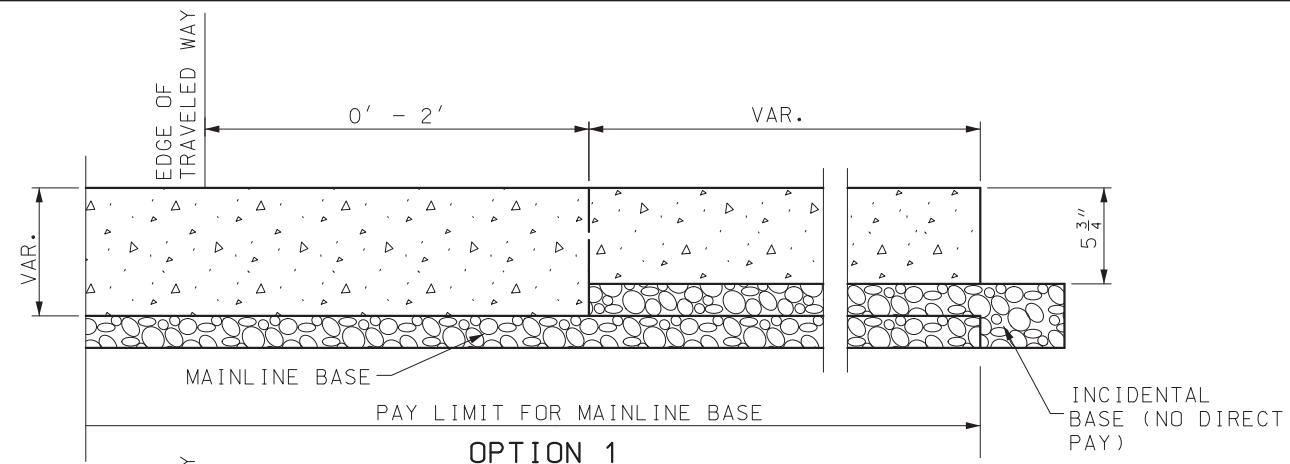
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

PORE PRESSURE  
MEASUREMENT DEVICES

DATE EFFECTIVE: 03/01/1996  
DATE PREPARED: 8/21/2009

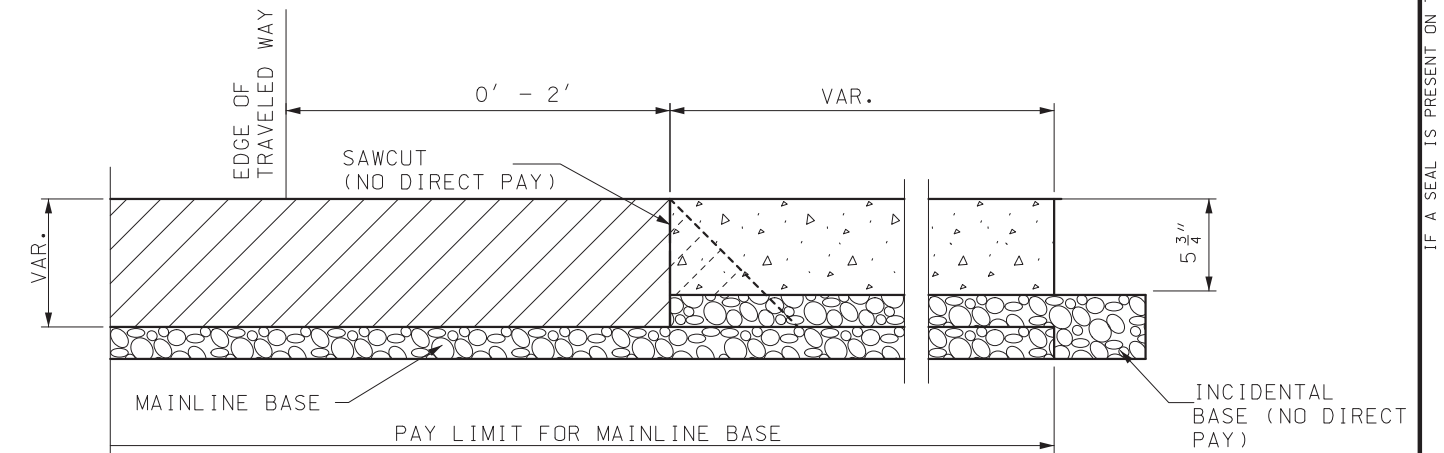
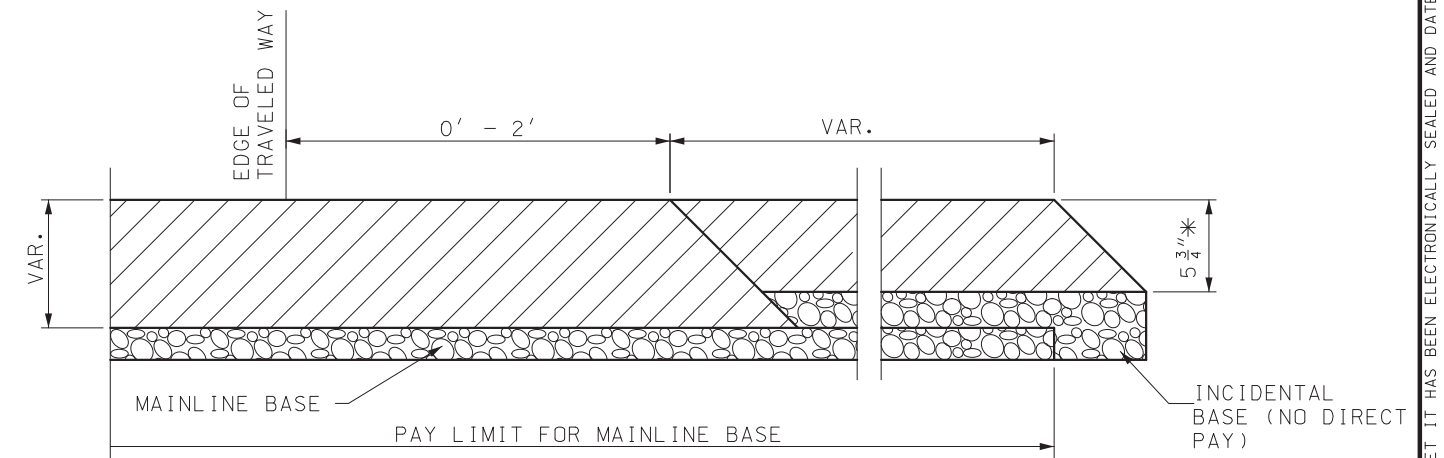
204.30

SHEET NO.  
1 OF 1



RCC (ROLLER COMPACTED CONCRETE) OR  
PCC (PORTLAND CEMENT CONCRETE)  
HMA (HOT MIX ASPHALT)  
BASE

\* USE 1 3/4" BP-1 OVER 4" PMBB UNLESS OTHERWISE SPECIFIED ON THE PLANS.



#### GENERAL NOTE:

THE FINAL FINISH ON CONCRETE SHOULDERS MAY BE OBTAINED BY THE USE OF A DRAG CONSISTING OF A SEAMLESS STRIP OF DAMP BURLAP, COTTON FABRIC, PLASTIC TURF, OR OTHER SUITABLE MATERIAL CAPABLE OF PRODUCING A UNIFORM SURFACE OF GRITTY TEXTURE.

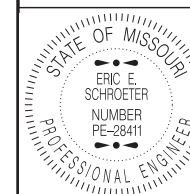
THE QUANTITY FOR ADDITIONAL BASE MATERIAL RESULTING FROM THE VARIABLE THICKNESS MATERIAL OR CONSTRUCTION METHOD OF TYPE A2 SHOULDER WILL BE CONSIDERED INCIDENTAL.

INCIDENTAL BASE SHALL CONSIST OF TYPE 1 OR 5 AGGREGATE FOR BASE, OR AN ALTERNATE MATERIAL THAT MEETS THE APPROVAL OF THE ENGINEER.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

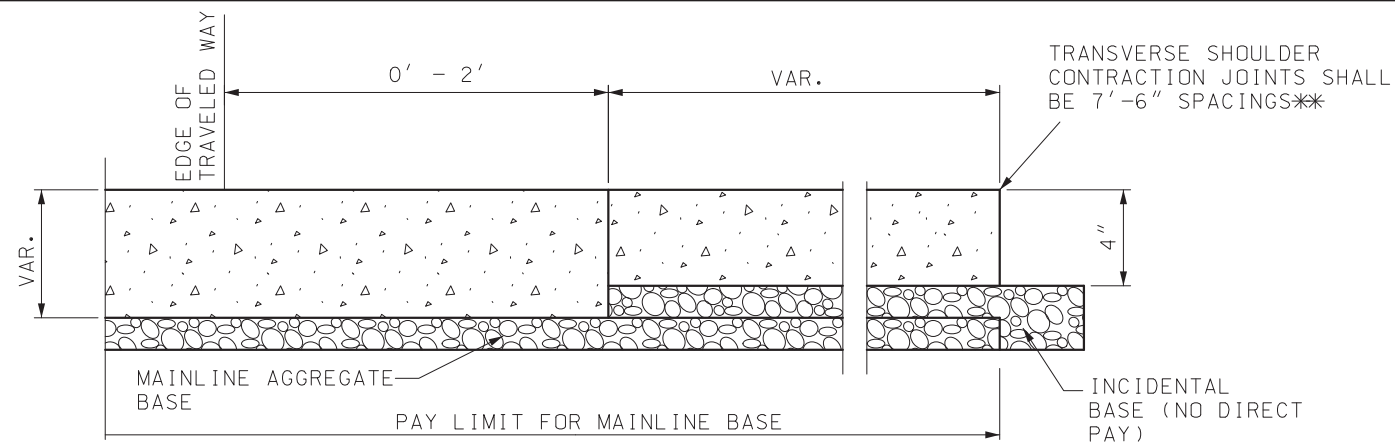
### TYPE A2 SHOULDERS

DATE EFFECTIVE: 07/01/2018  
DATE PREPARED: 5/3/2018

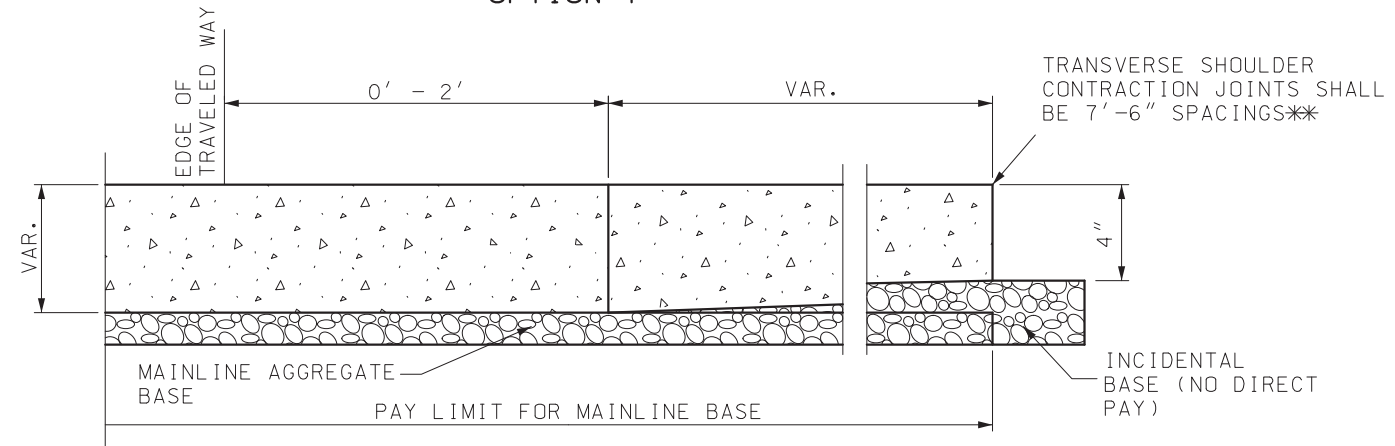
401.00C

SHEET NO.  
1 OF 3

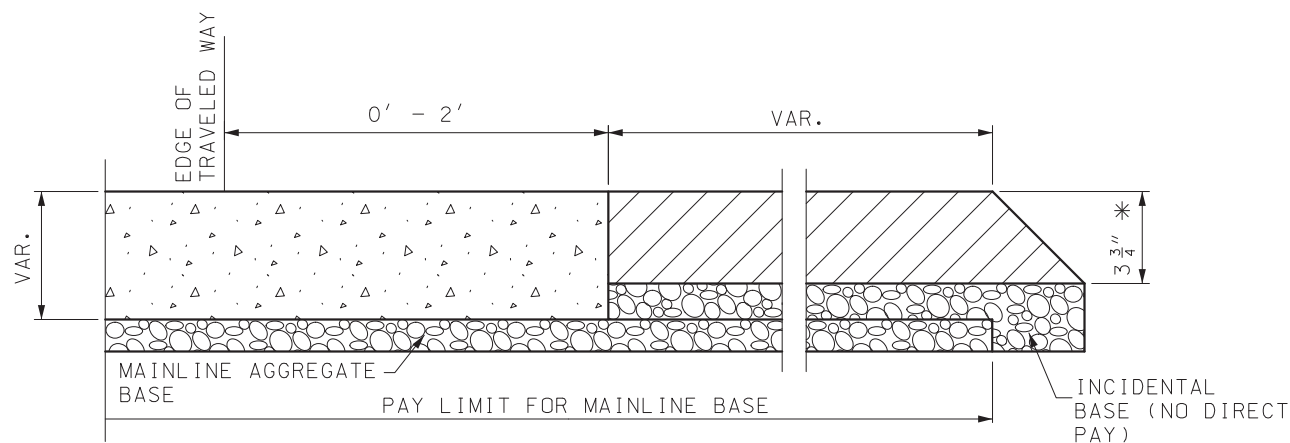




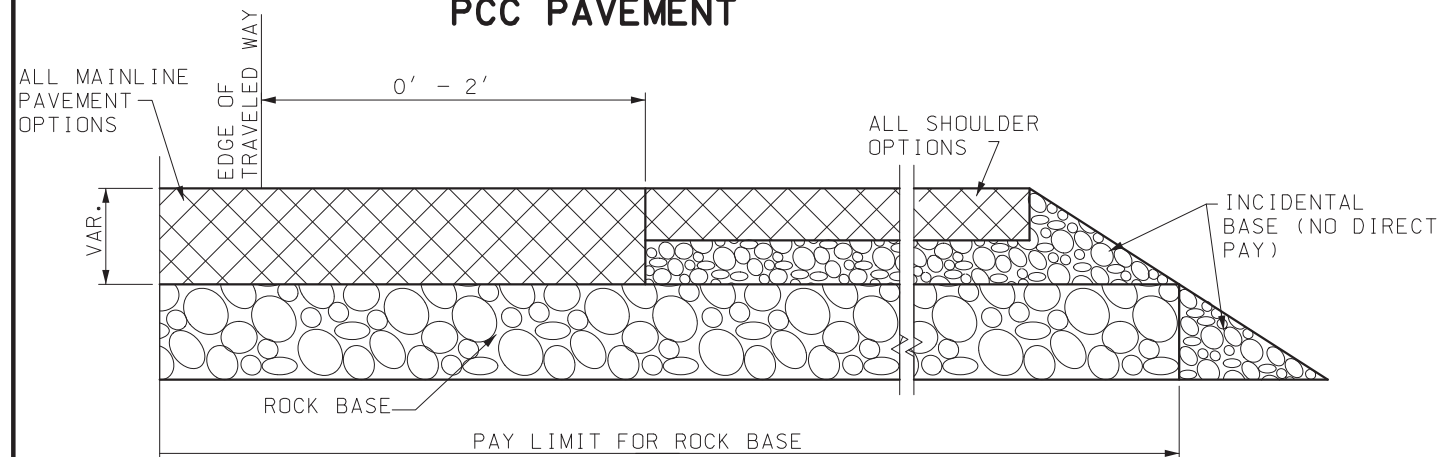
OPTION 1



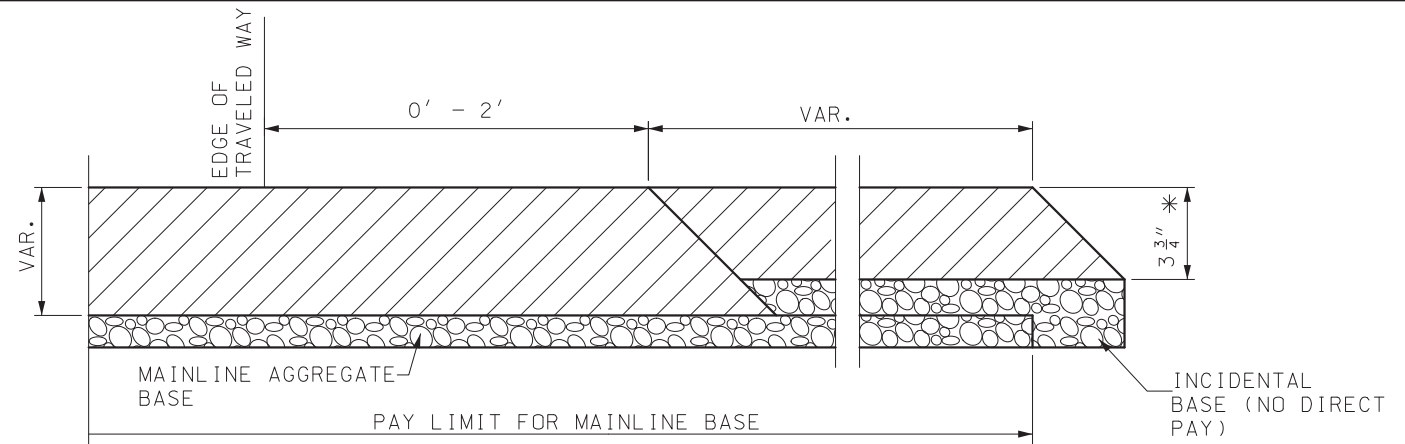
OPTION 2



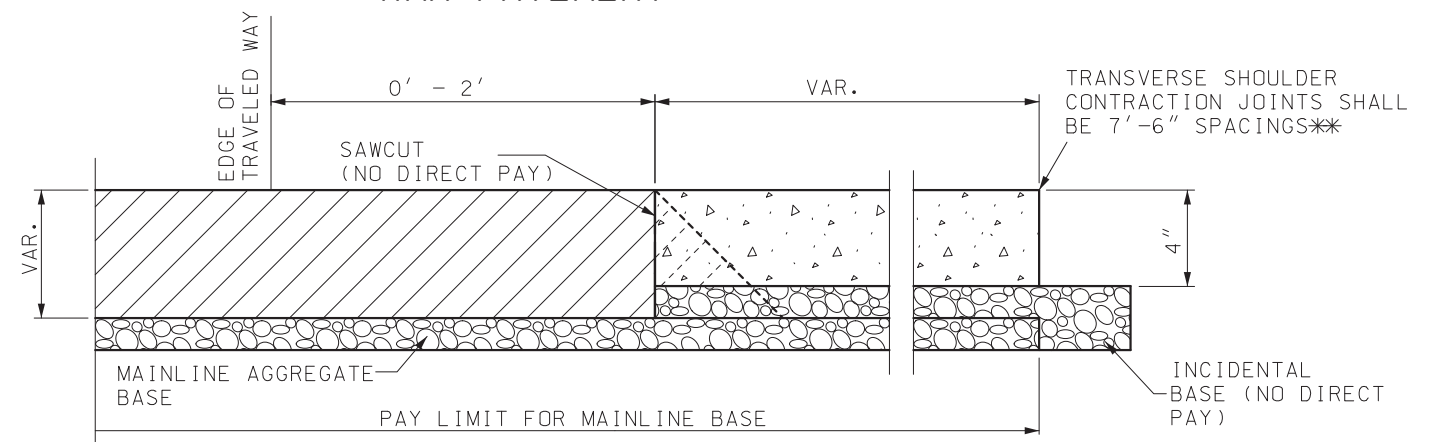
OPTION 3  
PCC PAVEMENT



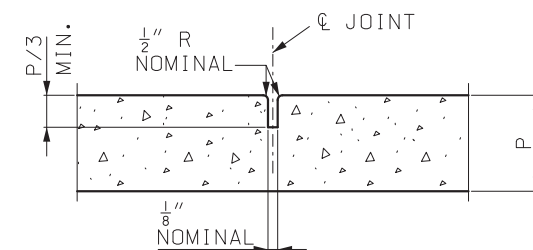
PAVEMENT ON ROCK BASE



HMA PAVEMENT

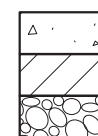


HMA PAVEMENT



TOOL JOINT

P = SHOULDER THICKNESS



RCC (ROLLER COMPACTED CONCRETE) OR  
PCC (PORTLAND CEMENT CONCRETE)  
HMA (HOT MIX ASPHALT)

BASE

\* USE 3 3/4" BP-1 UNLESS OTHERWISE  
SPECIFIED ON THE PLANS.

\*\* JOINT DEPTH SHALL BE P/3 AND MAY  
BE SAWED OR TOOLED.

GENERAL NOTE:

THE FINAL FINISH ON CONCRETE SHOULDERS MAY BE OBTAINED BY THE USE OF A DRAG CONSISTING OF A SEAMLESS STRIP OF DAMP BURLAP, COTTON FABRIC, PLASTIC TURF OR OTHER SUITABLE MATERIAL CAPABLE OF PRODUCING A UNIFORM SURFACE OF GRITTY TEXTURE.

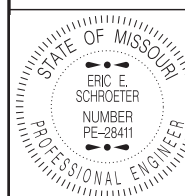
THE QUANTITY FOR ADDITIONAL BASE MATERIAL RESULTING FROM THE VARIABLE THICKNESS MATERIAL OR CONSTRUCTION METHOD OF TYPE A3 SHOULDER WILL BE CONSIDERED INCIDENTAL.

INCIDENTAL BASE SHALL CONSIST OF TYPE 1 OR 5 AGGREGATE FOR BASE, OR AN ALTERNATE MATERIAL THAT MEETS THE APPROVAL OF THE ENGINEER.



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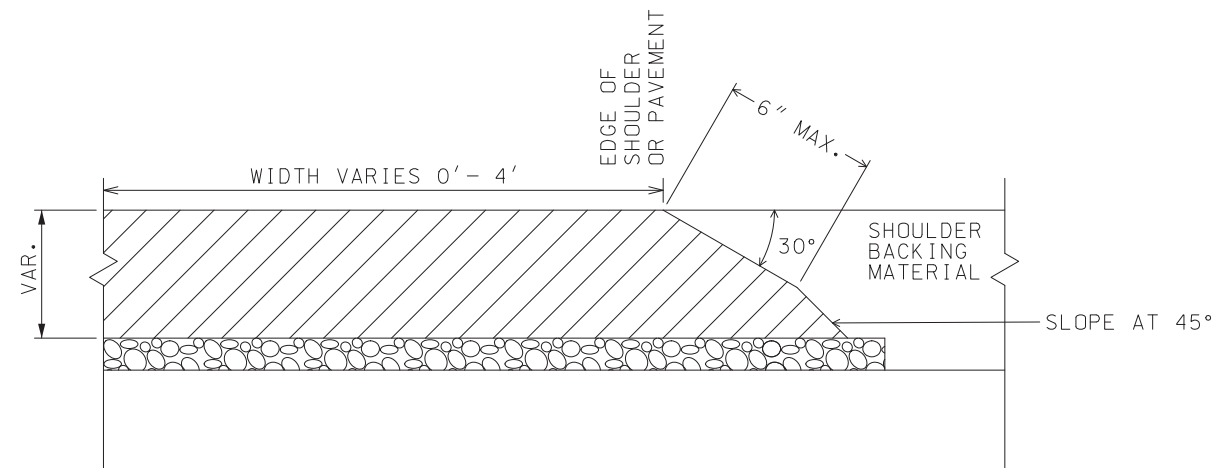
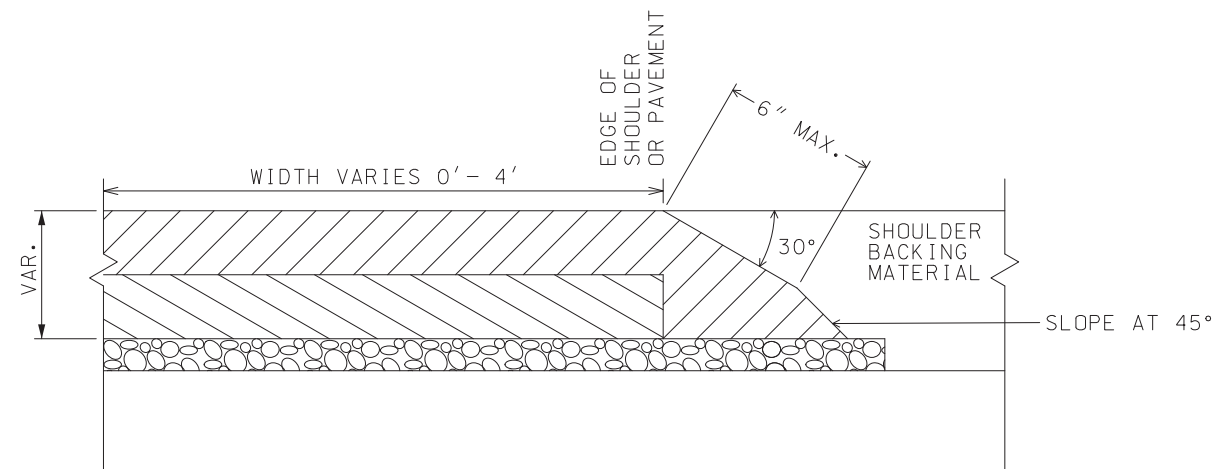
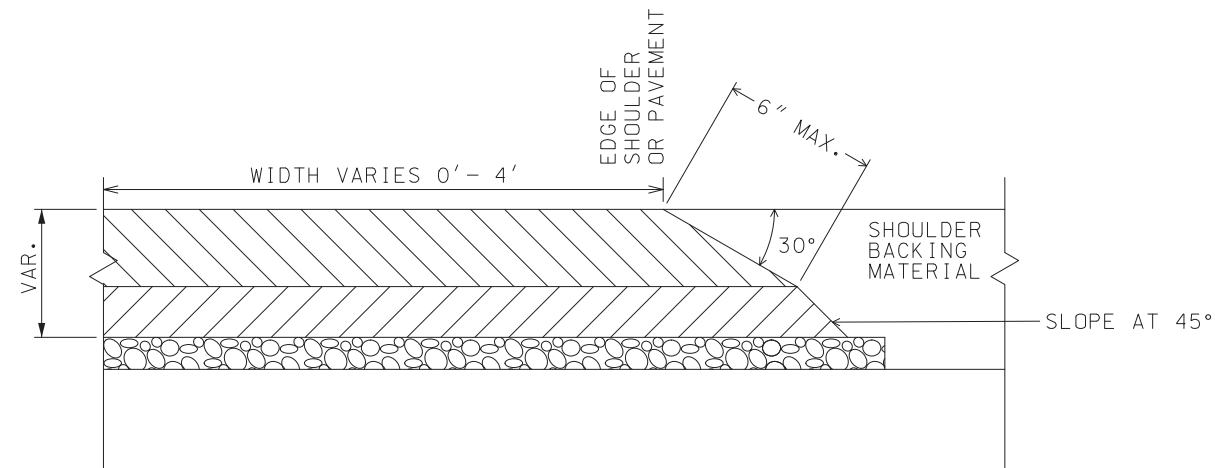
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

TYPE A3 SHOULDERS

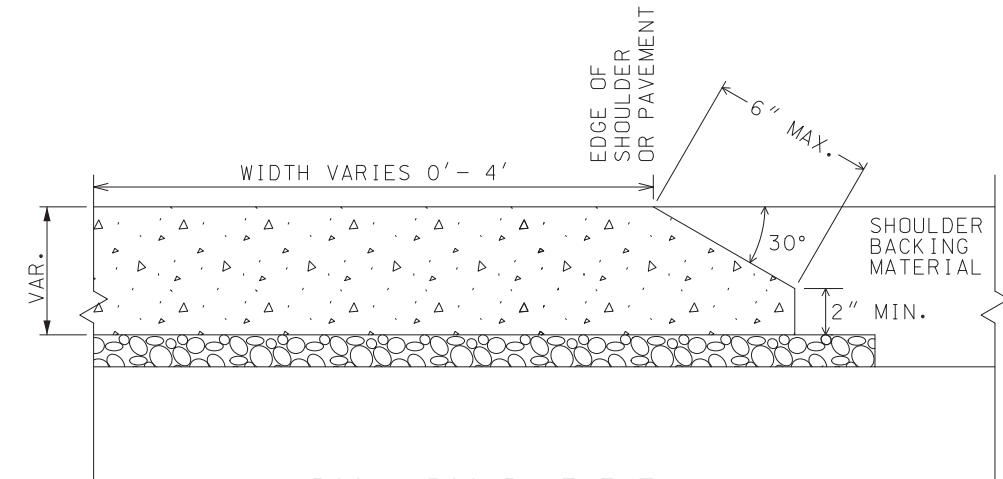
DATE EFFECTIVE: 07/01/2018  
DATE PREPARED: 5/3/2018

401.00C

SHEET NO.  
2 OF 3



HMA PAVEMENT



PCC / RCC PAVEMENT

-  RCC (ROLLER COMPACTED CONCRETE) OR PCC (PORTLAND CEMENT CONCRETE)
-  HMA (HOT MIX ASPHALT)
-  BASE MATERIAL (IF APPLICABLE)

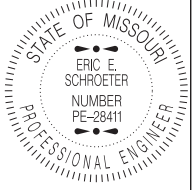
GENERAL NOTES:

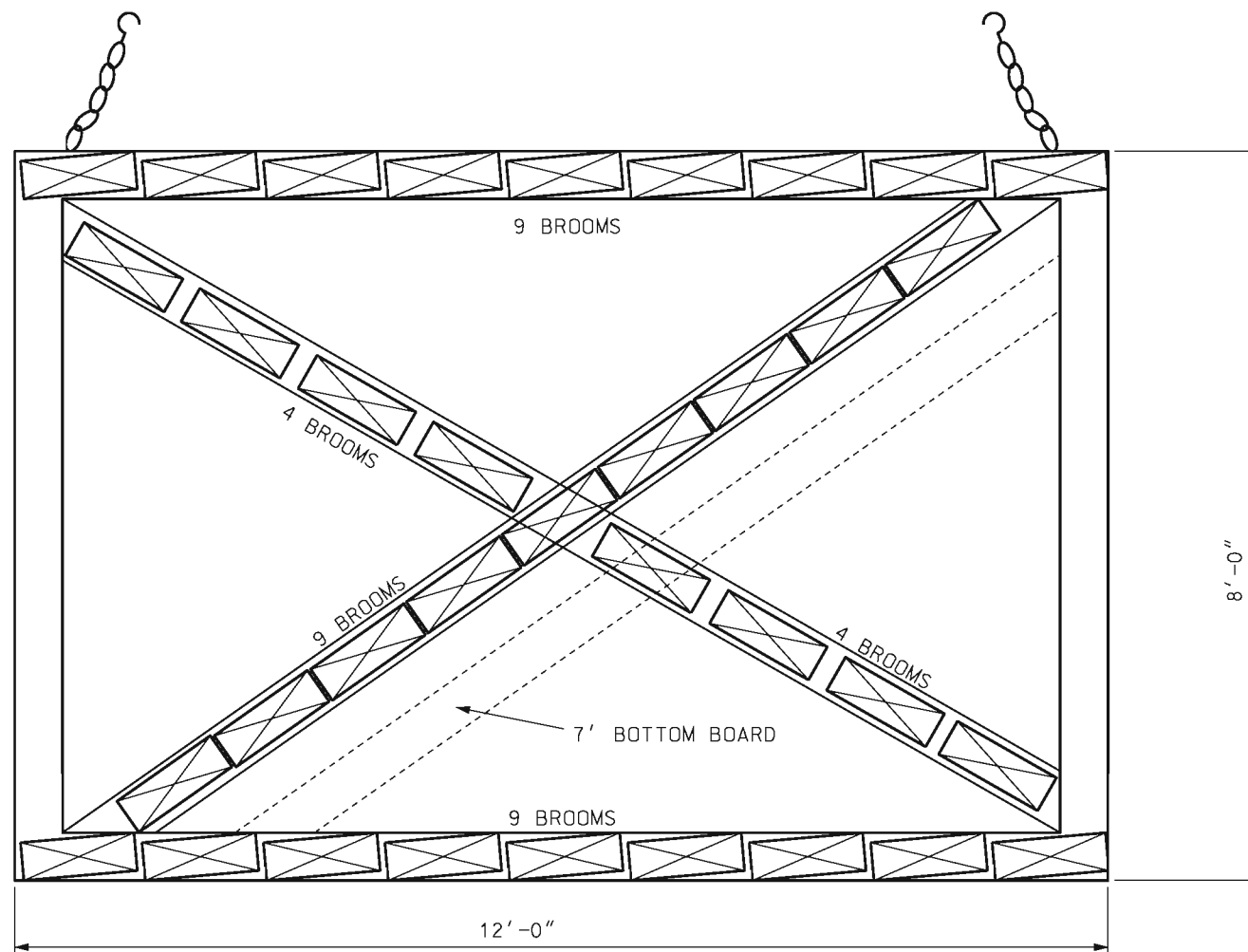
THE SAFETY EDGE<sup>SM</sup> SHALL BE CONSTRUCTED AT A SLOPE OF 30° FROM THE HORIZONTAL. THE LENGTH, AS MEASURED ALONG THE SLOPE, SHALL BE APPROXIMATELY 2 TIMES THE DEPTH, UP TO A MAXIMUM LENGTH OF 6".

THE SAFETY EDGE<sup>SM</sup> SHALL BE CONSTRUCTED MONOLITHICALLY WITH THE SHOULDER OR PAVEMENT.

THE SAFETY EDGE<sup>SM</sup> SHALL BE BACKFILLED AS SHOWN.

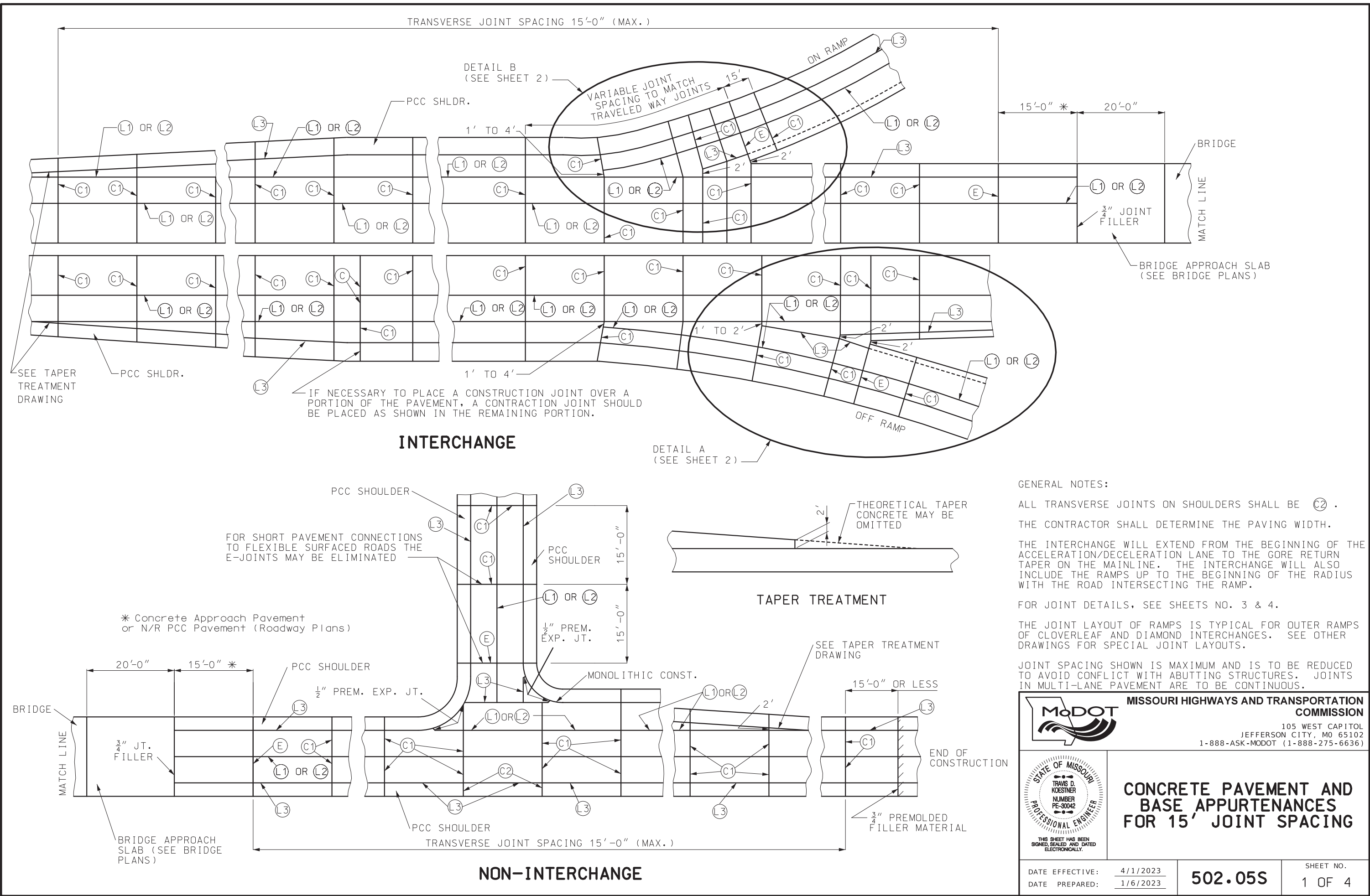
REGARDLESS OF PAVEMENT TYPE, WHEN PAYMENT FOR PAVEMENT OR SHOULDER IS MADE PER SQUARE YARD, THE MATERIAL NECESSARY TO CONSTRUCT THE SAFETY EDGE<sup>SM</sup> IS CONSIDERED INCIDENTAL TO THE PAVEMENT OR SHOULDER. NO MEASUREMENT WILL BE MADE FOR THE MATERIAL USED IN THE SAFETY EDGE<sup>SM</sup> EXCEPT WHEN PAYMENT FOR PAVEMENT OR SHOULDER IS MADE IN VOLUME OR WEIGHT.

|                                                                                                                                                                                                                                  |                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                 |
|                                                                                                                                             | <b>SAFETY EDGE<sup>SM</sup></b> |
| DATE EFFECTIVE: 07/01/2018<br>DATE PREPARED: 5/3/2018                                                                                                                                                                            | <b>401.00C</b>                  |
| SHEET NO.<br>3 OF 3                                                                                                                                                                                                              |                                 |

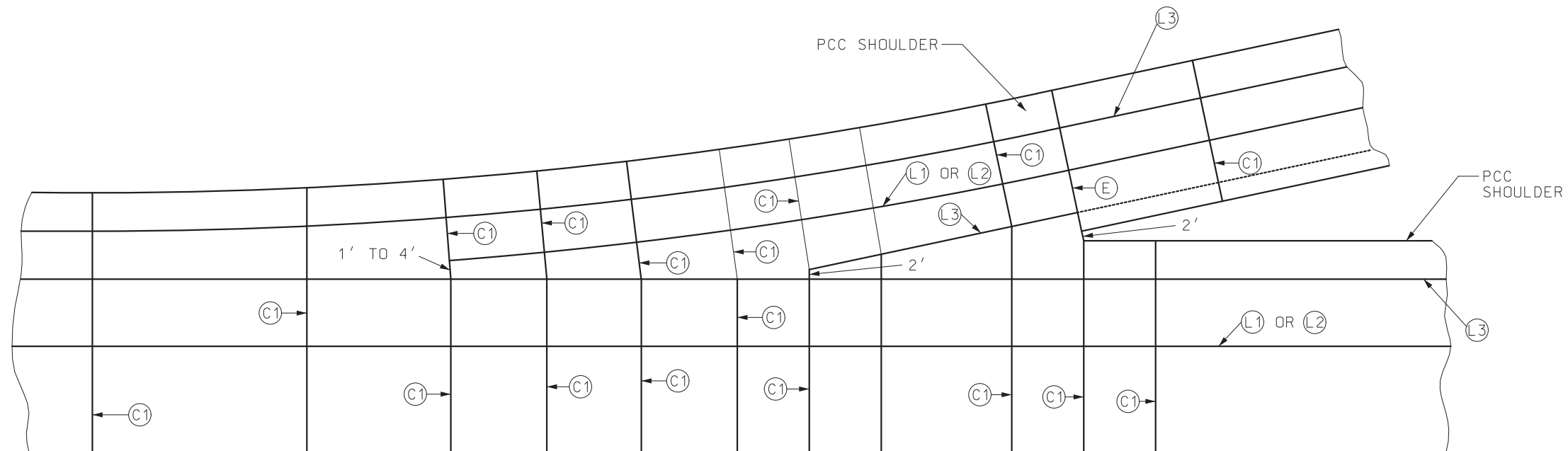


-  STREET BROOMS WITH NYLON BRISTLES
-  3/8" CHAIN WITH HOOKS

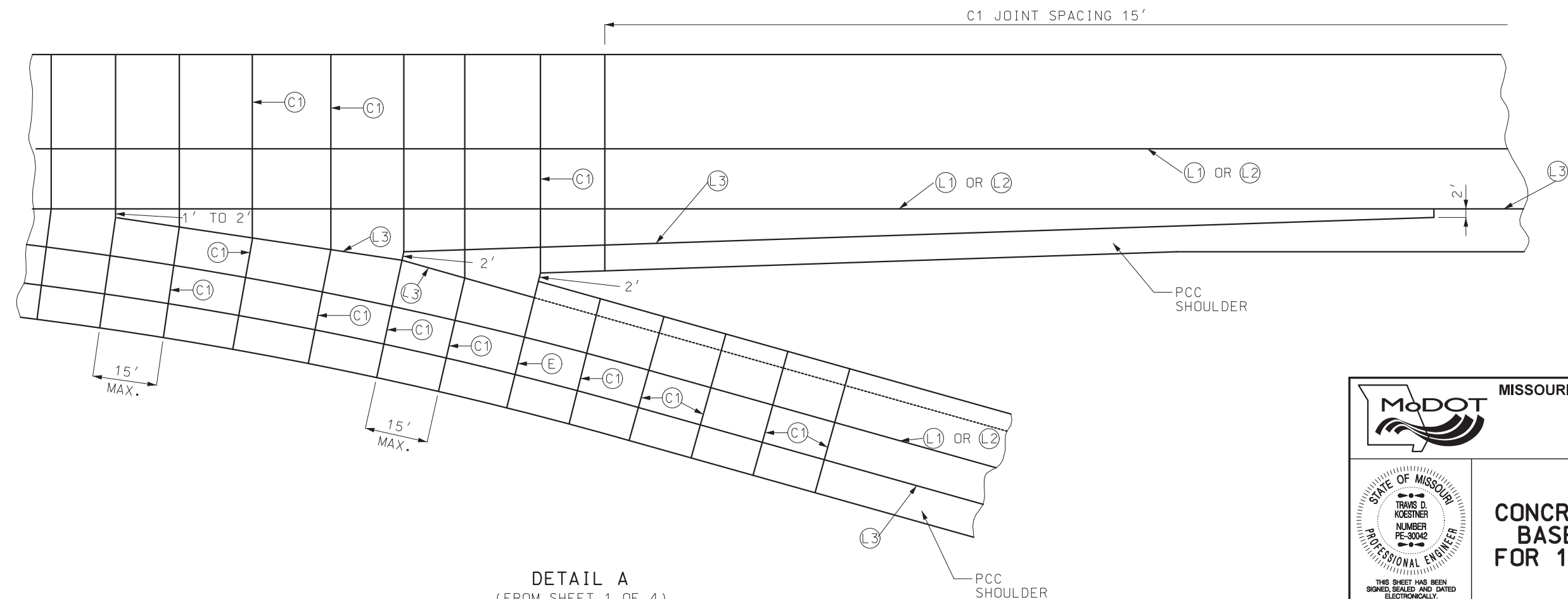
|                                                                                                                                                                                                                                  |                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                       |
|                                                                                                                                             | <b>SCRUB SEAL BROOM CONFIGURATION</b> |
| DATE EFFECTIVE: 07/01/2004<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <b>413.20</b>                         |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                       |



IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

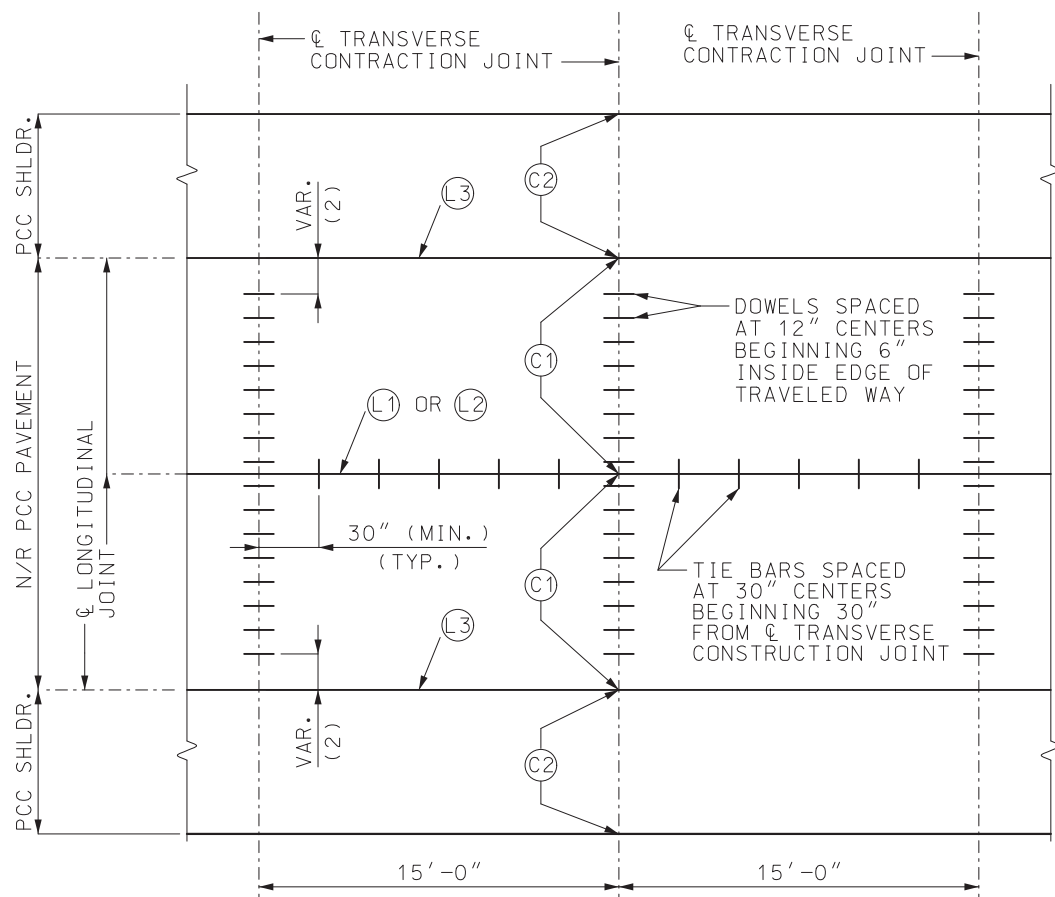


DETAIL B  
(FROM SHEET 1 OF 4)



DETAIL A  
(FROM SHEET 1 OF 4)

|                                                                                                                                                                                                                                  |                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                               |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <b>CONCRETE PAVEMENT AND<br/>BASE APPURTENANCES<br/>FOR 15' JOINT SPACING</b> |
| DATE EFFECTIVE: 4/1/2023<br>DATE PREPARED: 1/6/2023                                                                                                                                                                              | <b>502.05S</b>                                                                |
| SHEET NO.<br>2 OF 4                                                                                                                                                                                                              |                                                                               |

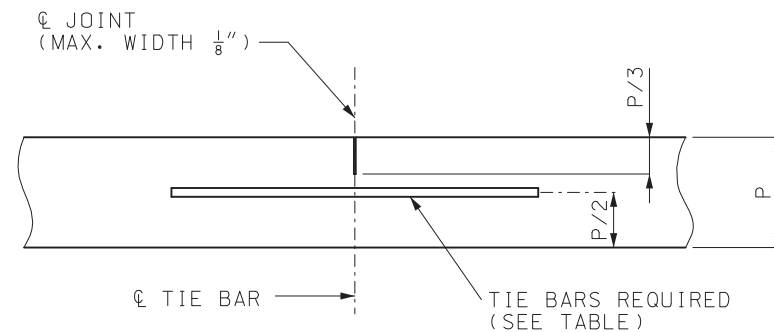


### JOINT PLAN AND SPACING FOR CONTRACTION JOINTS (1)

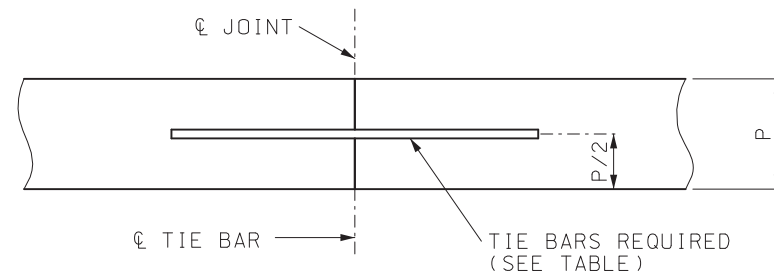
(1) LONGITUDINAL JOINT NOT REQUIRED FOR 4' OR NARROWER SHOULDER, PAVED MONOLITHICALLY WITH ADJACENT LANE AT THE SAME THICKNESS; FULL DEPTH SHOULDER WIDER THAN 4' SHALL REQUIRE (L1) OR (L2) JOINT INSTEAD OF (L3) JOINT.

(2) DOWEL BARS BEGIN 6" INSIDE EDGE OF TRAVELED WAY.

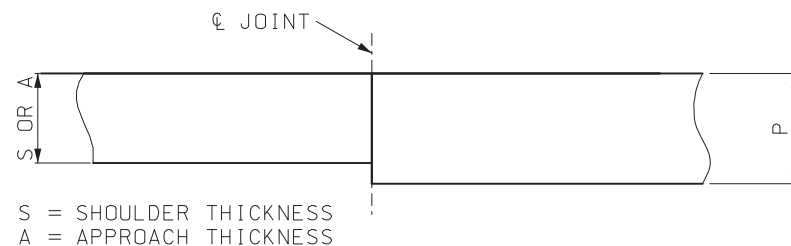
| DOWEL AND TIE BAR TABLE |            |           |         |           |
|-------------------------|------------|-----------|---------|-----------|
| PCCP THICKNESS (P)      | DOWEL      |           | TIE BAR |           |
|                         | SIZE       | SPACING   | SIZE    | SPACING   |
| LESS THAN 7"            | NONE       | NONE      | #5X30"  | 30" CTRS. |
| 7" TO 10"               | 1 1/4"X18" | 12" CTRS. | #5X30"  | 30" CTRS. |
| GREATER THAN 10"        | 1 1/2"X18" | 12" CTRS. | #6X40"  | 30" CTRS. |



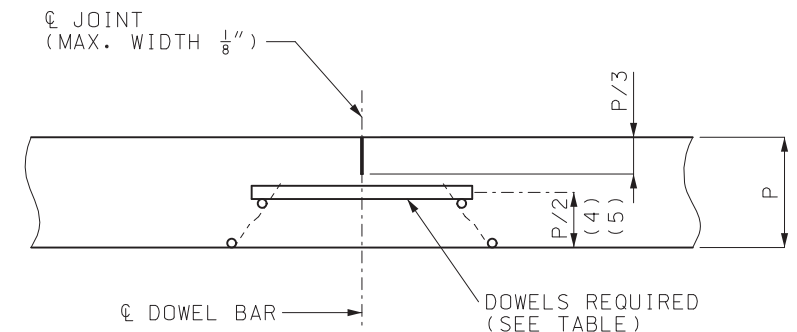
### LONGITUDINAL JOINT (L1)



### LONGITUDINAL CONSTRUCTION JOINT (L2)



### LONGITUDINAL CONSTRUCTION JOINT FOR SHOULDER AND APPROACHES (L3)



FOR PERMISSIBLE TYPES OF DOWEL SUPPORTING UNITS, SEE OTHER DRAWINGS.

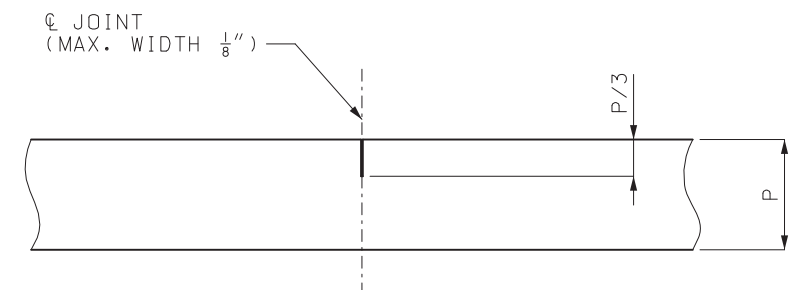
TRANSVERSE CONTRACTION JOINTS FOR CONCRETE PAVEMENT OR BASE WIDENING SHALL MATCH EXISTING JOINTS.

### TRANSVERSE CONTRACTION JOINT (C1) (3)

(3) DOWEL BARS ARE REQUIRED FOR ALL PAVEMENTS HAVING THE SAME THICKNESS AS THE TRAVELED WAY.

(4) FOR PAVEMENTS HAVING THICKNESS IN 1/2" INCREMENTS, DOWEL BASKETS SHALL BE (P-1/2")/2.

(5) DOWEL BARS MAY BE PLACED BY MECHANICAL MEANS AT THE OPTION OF THE CONTRACTOR.



### TRANSVERSE CONTRACTION JOINT (C2)

GENERAL NOTES:

THE FINAL POSITION OF ALL DOWELS AND TIE BARS SHALL BE PERPENDICULAR TO THE PLANE OF THE JOINT AND PARALLEL TO THE SURFACE OF THE PAVEMENT AND PARALLEL TO EACH OTHER.

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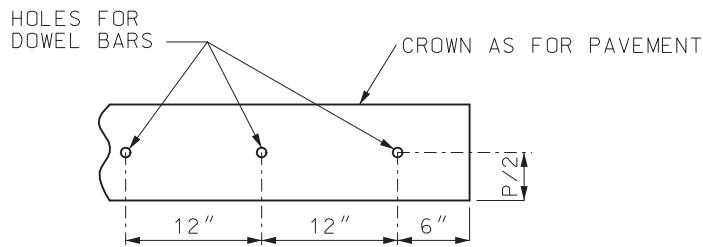
CONCRETE PAVEMENT AND  
BASE APPURTENANCES  
FOR 15' JOINT SPACING

DATE EFFECTIVE: 4/1/2023  
DATE PREPARED: 1/6/2023

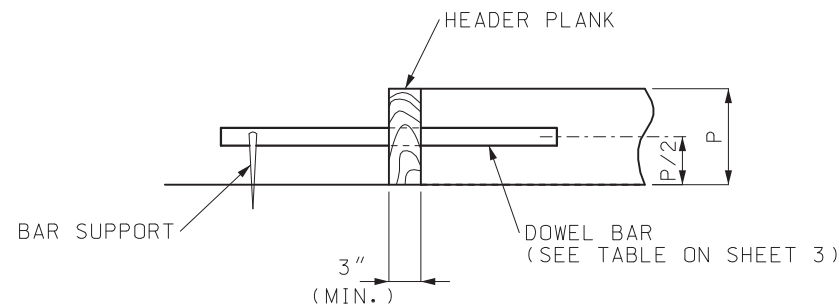
502.05S

SHEET NO.  
3 OF 4

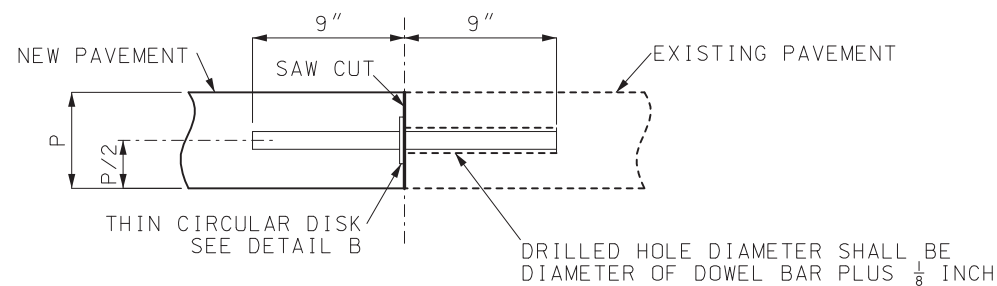




PART ELEVATION OF  
HEADER PLANK



HEADER SECTION



SAWED SECTION

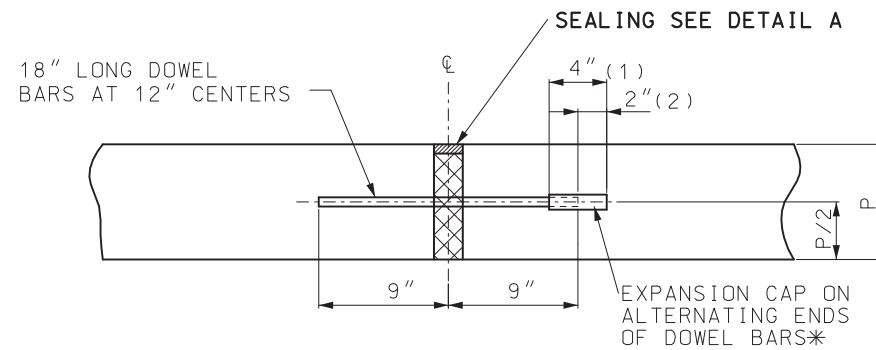
THE HEADER BOARD SHALL BE SUFFICIENTLY RIGID TO PREVENT DISTORTION FROM THE TYPICAL SECTION AND MAINTAIN A STRAIGHT LINE FROM PAVEMENT EDGE TO PAVEMENT EDGE.

THE CONSTRUCTION JOINT MAY BE SAWED FULL DEPTH. HOLES FOR DOWEL BARS SHALL BE DRILLED AFTER THE CONCRETE HAS SUFFICIENT SET TO PREVENT DAMAGE. DOWEL BARS SHALL BE BONDED INTO THE HOLES.

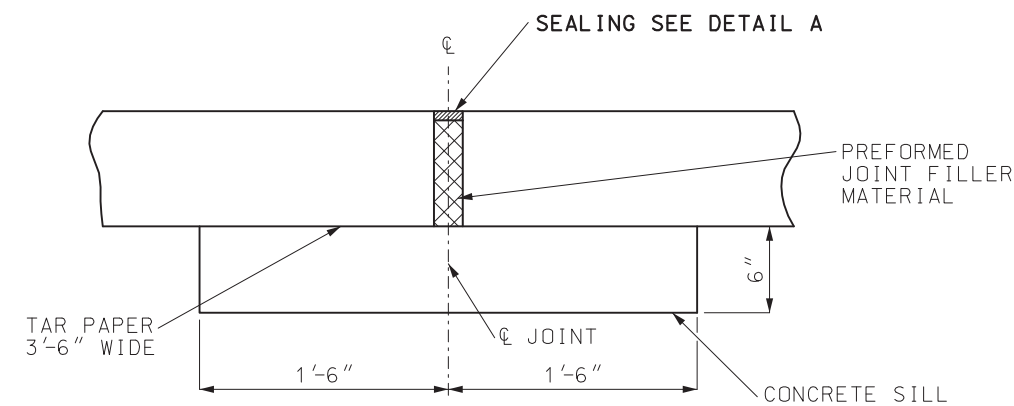
BONDING FOR DOWEL BARS SHALL BE EPOXY OR POLYESTER BONDING AGENTS AS SPECIFIED IN SECTION 1039.

THE PORTION OF THE DOWEL OUTSIDE THE HOLE SHALL BE COATED WITH AN APPROVED LUBRICANT.

## CONSTRUCTION JOINT (C)



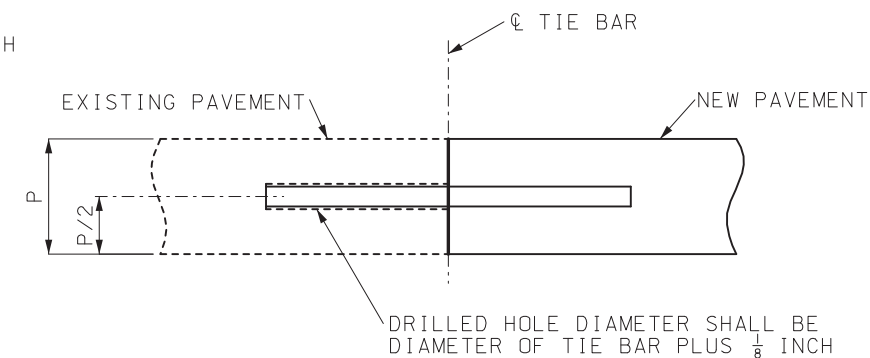
## EXPANSION JOINT (E)



SILL SHALL EXTEND 18" BEYOND EACH EDGE OF THE PAVEMENT AND SHALL BE CONSTRUCTED OF CONCRETE REGARDLESS OF ADJACENT BASE MATERIAL.

## ALTERNATE EXPANSION JOINT (E)

(CONTRACTOR MAY SELECT EITHER EXPANSION JOINT (E))



TIE BARS SHALL BE EPOXY COATED, DEFORMED REINFORCING BARS MEETING THE REQUIREMENTS OF SECTIONS 710 AND 1057.

BONDING FOR TIE BARS SHALL BE EPOXY OR POLYESTER BONDING AGENTS AS SPECIFIED IN SECTION 1039.

TIE BAR SIZE AND LENGTH SHALL BE BASED ON THE THICKNESS OF THE THINNER PAVEMENT OR SHOULDER TO BE TIED TOGETHER.

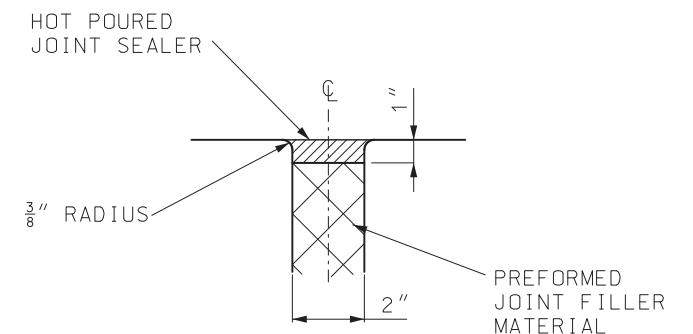
## LONGITUDINAL CONSTRUCTION JOINT (L)

(EXISTING PAVEMENT)

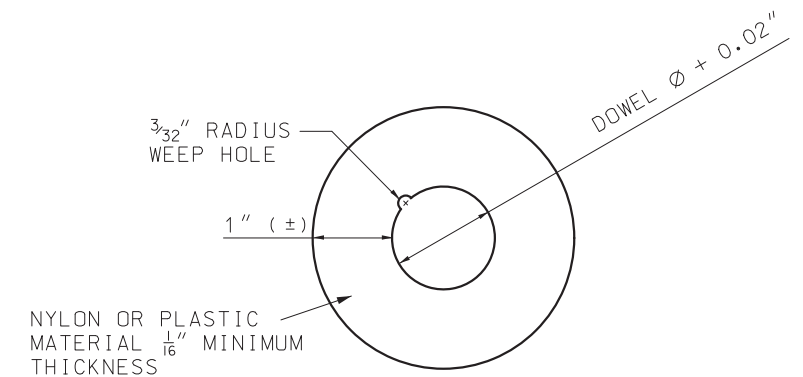
(1) LENGTH OF CAP

(2) GAP BETWEEN END OF  
CAP AND DOWEL.

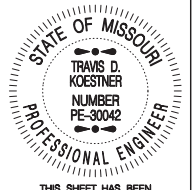
\* FOR EXPANSION JOINTS FORMED USING A CONSTRUCTION HEADER, THE EXPANSION CAPS SHALL BE INSTALLED ON THE EXPOSED END OF EACH BAR ONCE THE HEADER HAS BEEN REMOVED AND THE JOINT FILLER MATERIAL HAS BEEN INSTALLED.

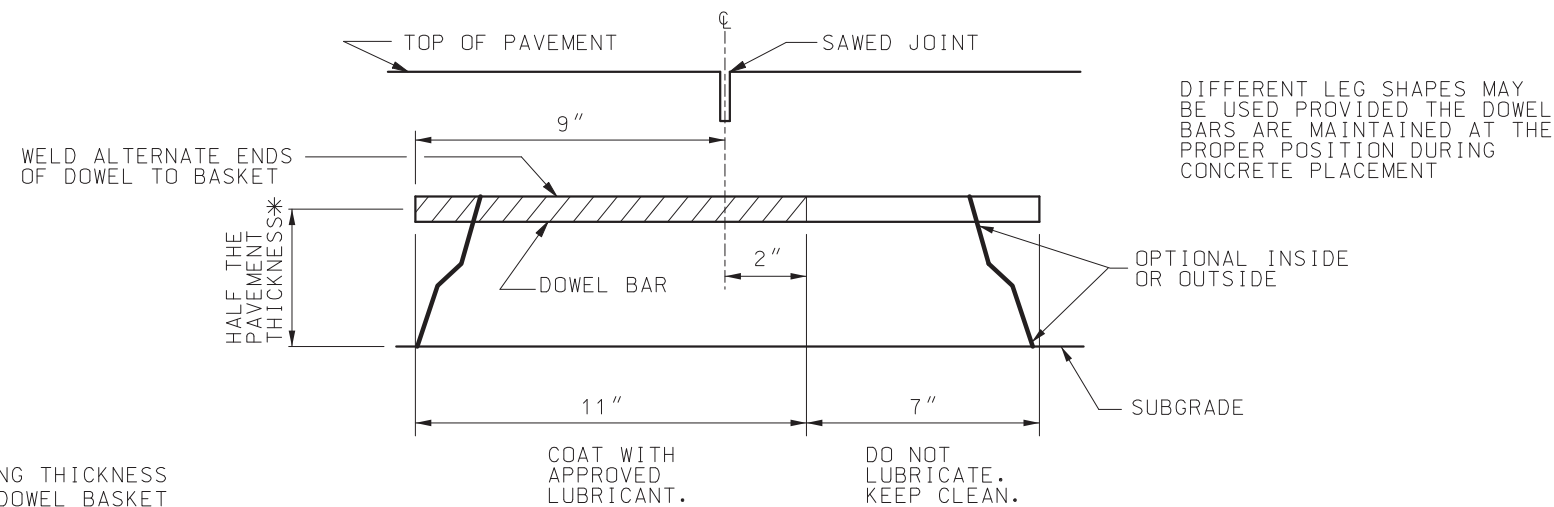


DETAIL A  
SEALING



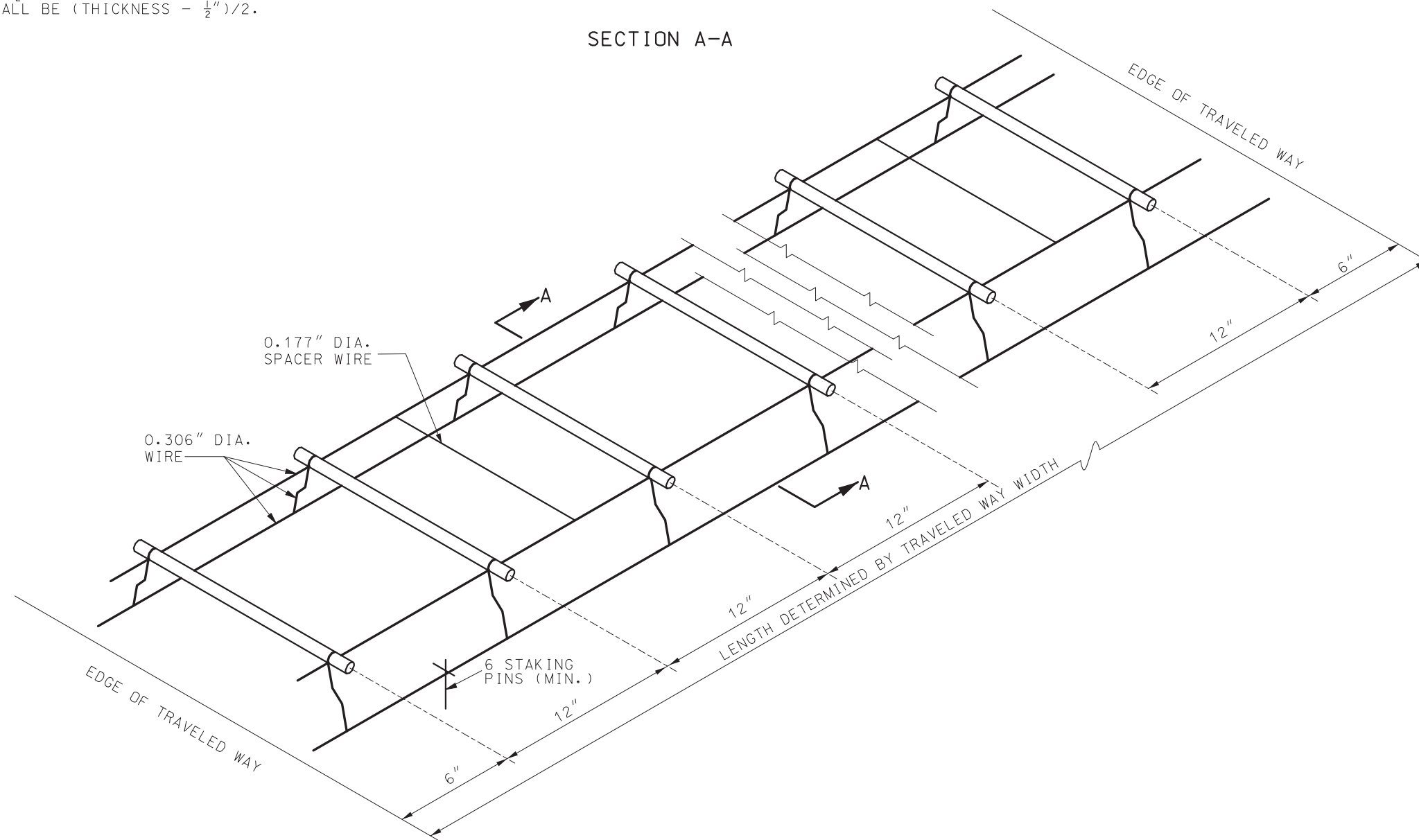
DETAIL B  
THIN CIRCULAR DISK

|                                                                                                                                                                                                                                  |                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                               |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <b>CONCRETE PAVEMENT AND<br/>BASE APPURTENANCES<br/>FOR 15' JOINT SPACING</b> |
| DATE EFFECTIVE: 4/1/2023<br>DATE PREPARED: 1/6/2023                                                                                                                                                                              | <b>502.05S</b>                                                                |
| SHEET NO.<br>4 OF 4                                                                                                                                                                                                              |                                                                               |



\* FOR PAVEMENT HAVING THICKNESS IN  $\frac{1}{2}$ " INCREMENT, DOWEL BASKET SHALL BE  $(\text{THICKNESS} - \frac{1}{2})/2$ .

SECTION A-A



| DOWEL BARS         |                   |        |
|--------------------|-------------------|--------|
| PAVEMENT THICKNESS | BAR SIZE          |        |
|                    | DIAMETER          | LENGTH |
| LESS THAN 7"       | NONE              | NONE   |
| 7" TO 10"          | 1 $\frac{1}{4}$ " | 18"    |
| GREATER THAN 10"   | 1 $\frac{1}{2}$ " | 18"    |

GENERAL NOTES:

THE DOWEL SUPPORTING UNITS SHALL BE FACTORY ASSEMBLED AND CAPABLE OF HOLDING THE DOWELS IN THEIR REQUIRED POSITIONS. IN THE COMPLETED JOINT INSTALLATION, DOWELS SHALL BE POSITIONED WITHIN  $\frac{1}{2}$ " OF THE VERTICAL AND HORIZONTAL PLANE AND IN THE LONGITUDINAL DIRECTION. THE SKEW TOLERANCE SHALL BE  $\frac{1}{4}$ ".

THE FREE END OF EACH EPOXY COATED DOWEL SHALL BE MARKED WITH A SPOT OF PAINT AT LEAST ONE INCH IN DIAMETER AND CONTRASTING IN COLOR WITH THE EPOXY COATING.

WIRE SIZES SHOWN ARE MINIMUM REQUIRED.

WIRES, BARS OR CLIPS SHALL BE USED AS NECESSARY TO STRENGTHEN THE ASSEMBLIES.

THE DIAMETER OF THE SPACER WIRE SHALL NOT EXCEED 0.200".

SPACER WIRE MAY BE CUT OR LEFT INTACT.

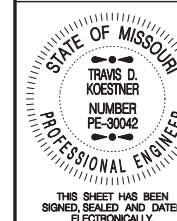
STAKING PINS SHALL BE FABRICATED FROM 0.306" DIAMETER WIRE MINIMUM WITH A SUITABLE HOOK. STAKING PINS SHALL HAVE A MINIMUM LENGTH OF 12" FOR DOWEL ASSEMBLIES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

MINOR VARIATIONS IN THE CONFIGURATION OF THE SUPPORT UNITS WILL BE ALLOWED.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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DOWEL SUPPORTING UNITS

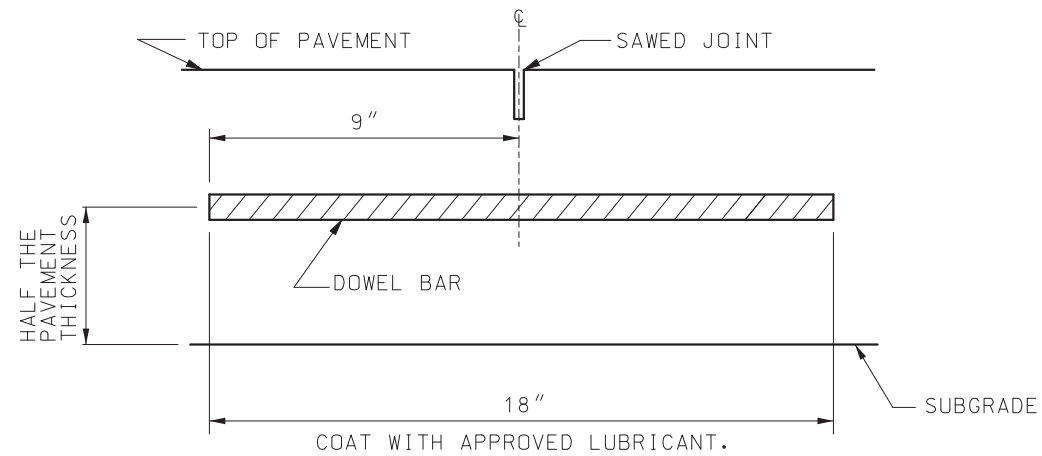
APPROVED FOR USE  
WITH TRANSVERSE JOINTS

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 4/5/2023

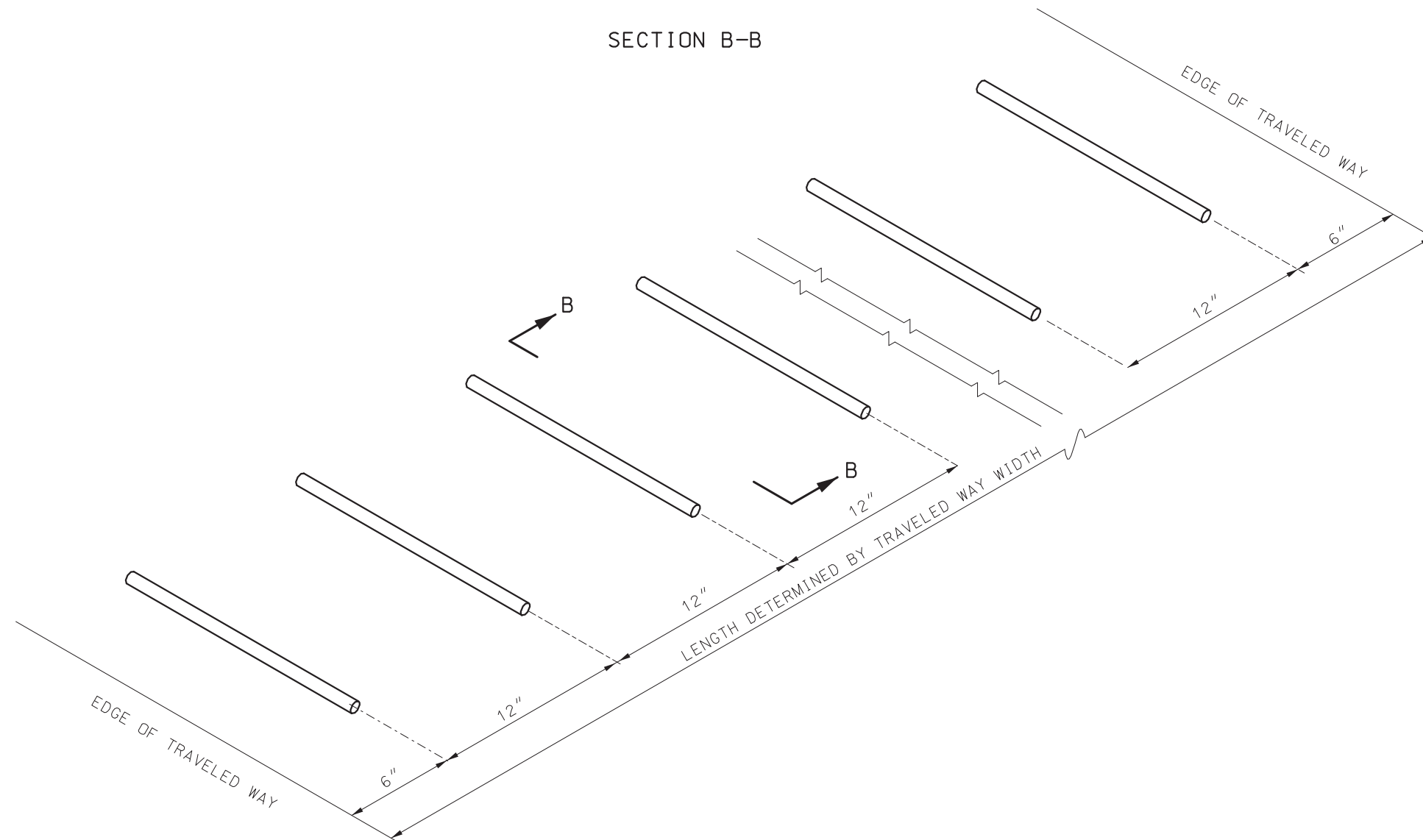
502.10L

SHEET NO.  
1 OF 2





SECTION B-B



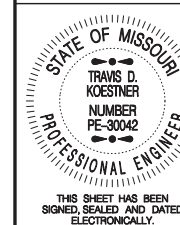
GENERAL NOTES:

IN THE COMPLETED JOINT INSTALLATION, DOWELS SHALL BE POSITIONED WITHIN 1/2" OF THE VERTICAL AND HORIZONTAL PLANE AND IN THE LONGITUDINAL DIRECTION. THE SKEW TOLERANCE SHALL BE 1/4".



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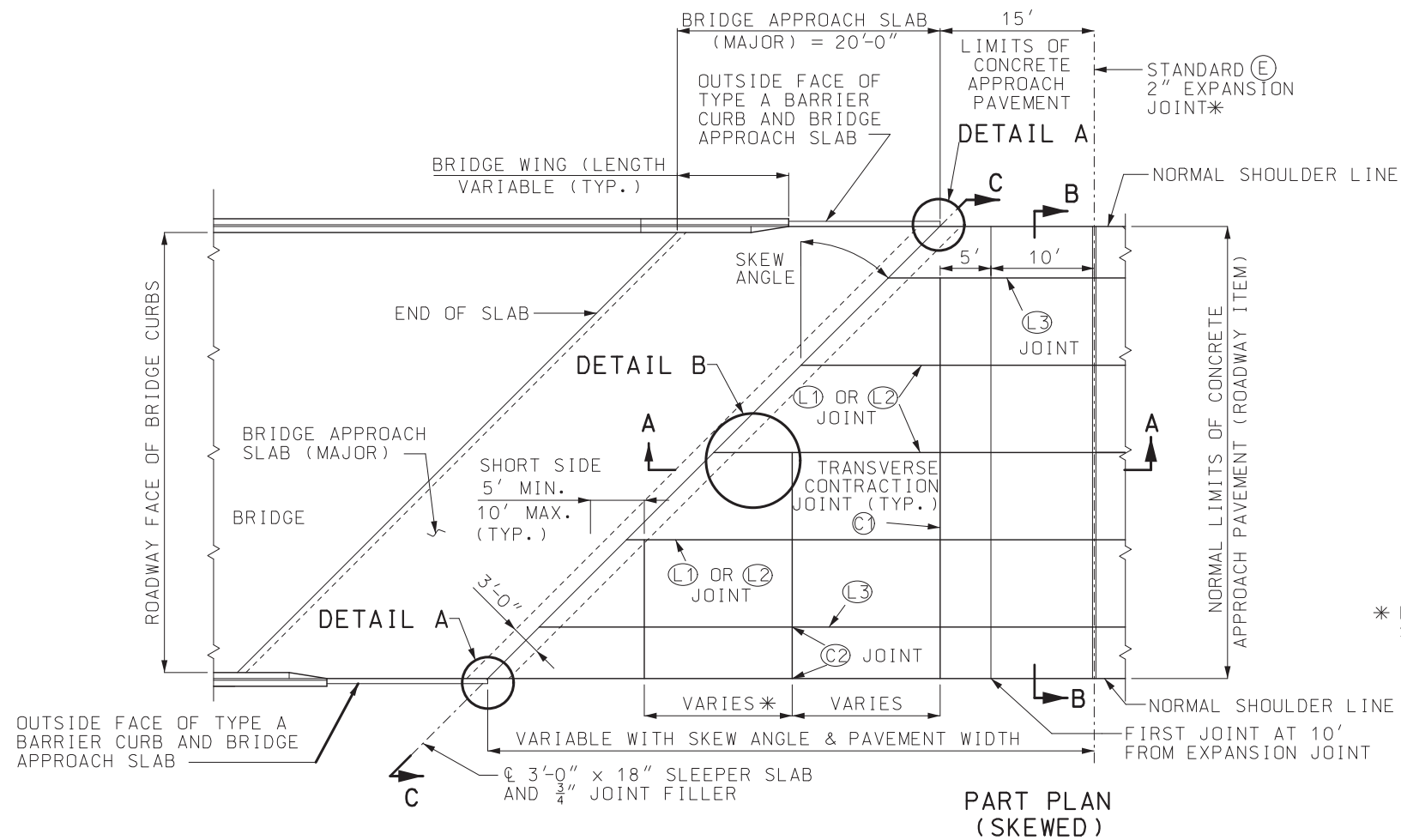
DOWEL SUPPORTING UNITS  
MECHANICAL PLACEMENT

DATE EFFECTIVE: 4/1/2023  
DATE PREPARED: 1/6/2023

502.10L

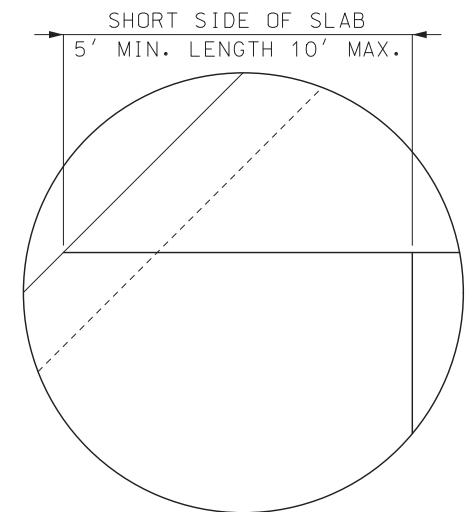
SHEET NO.  
2 OF 2



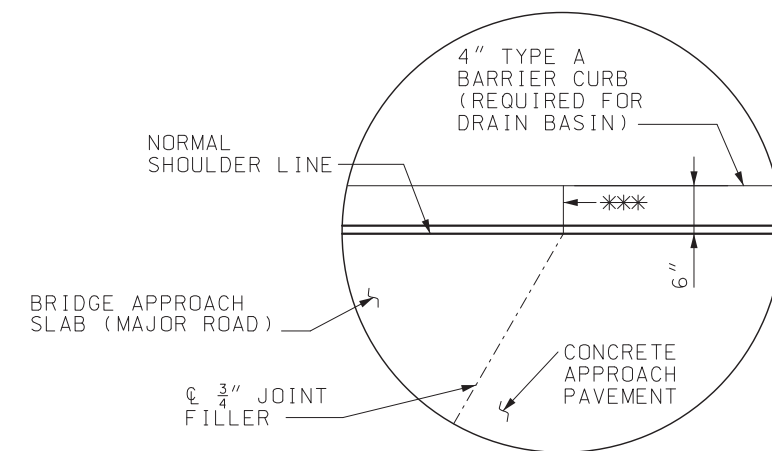


\* LENGTH OF RECTANGULAR SLABS BETWEEN SKEWED SLAB AND FIRST 10' SLAB SHALL BE 10' TO 15'.

NOTE:  
SHORT SIDE OF SKEWED SLAB FOR ALL LANES NEXT TO BRIDGE APPROACH SLAB SHALL BE 5' TO 10'.



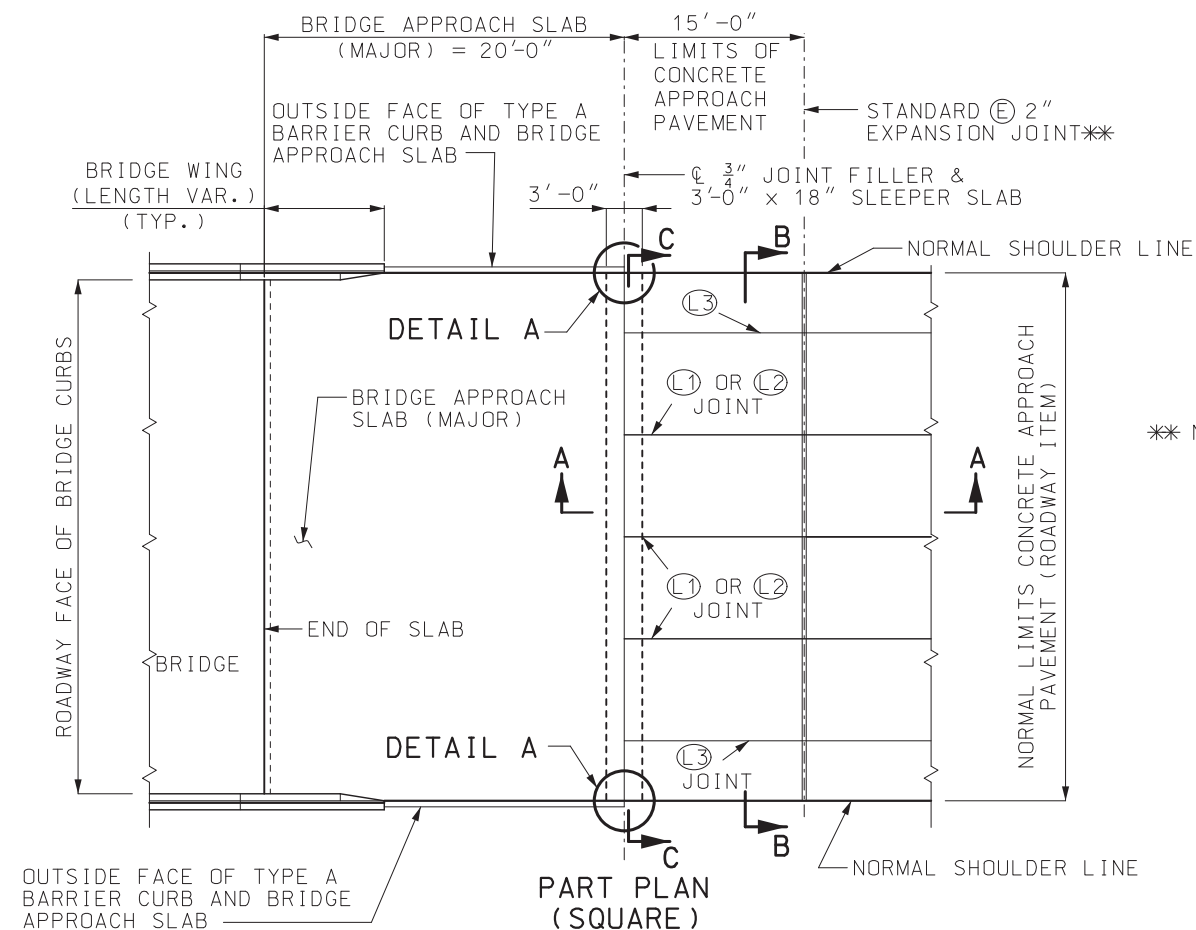
DETAIL B



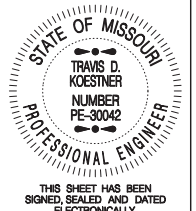
\*\*\* USE 3/4" JOINT FILLER BETWEEN TYPE A CURBS

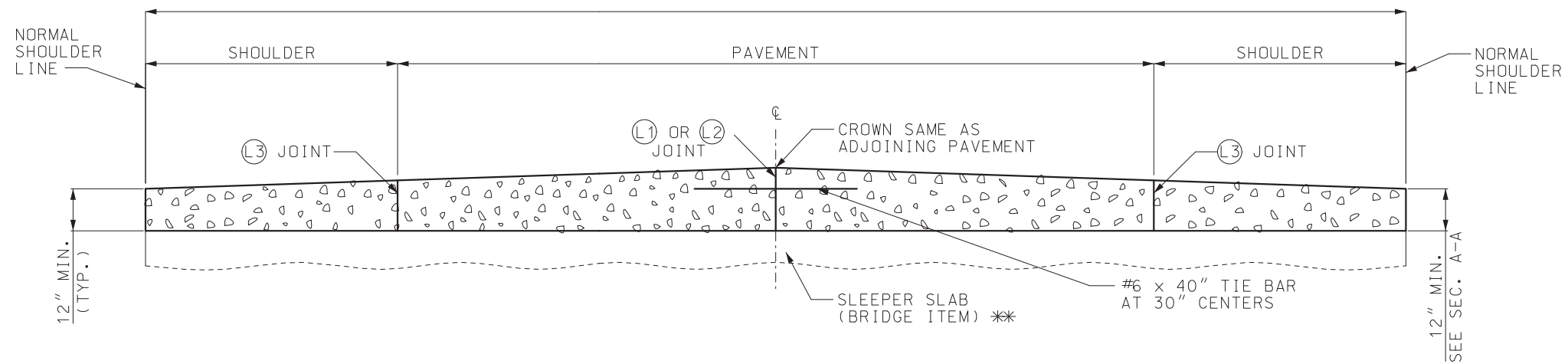
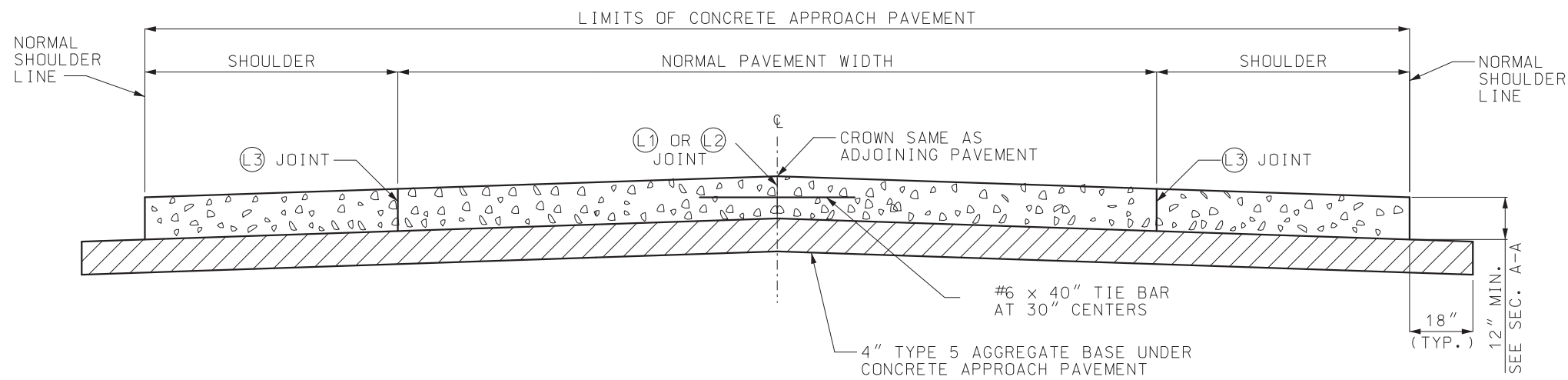
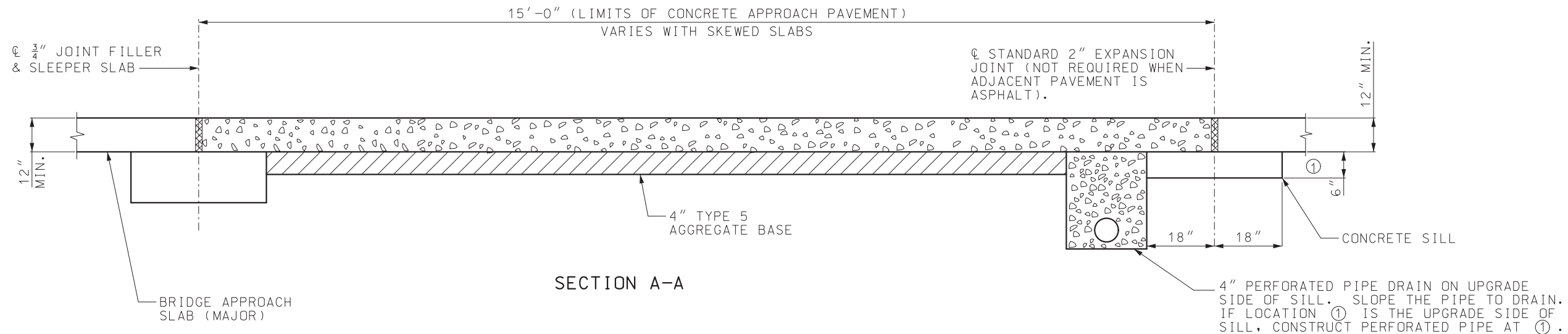
DETAIL A

\*\* NOT REQUIRED WHEN ADJACENT PAVEMENT IS ASPHALT.



NOTE:  
FOR SECTIONS A-A, B-B AND C-C, SEE SHEET 3 OF 3.

|                                                                                                                                                                                                                                  |                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                             |
|                                                                                                                                             | <b>CONCRETE APPROACH PAVEMENT</b><br>FOR MULTI-LANE PAVEMENTS (MAJOR ROUTE) |
| DATE EFFECTIVE: 10/01/2022<br>DATE PREPARED: 7/19/2022                                                                                                                                                                           | <b>504.00L</b>                                                              |
| SHEET NO.<br><b>2 OF 3</b>                                                                                                                                                                                                       |                                                                             |

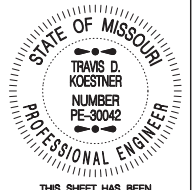


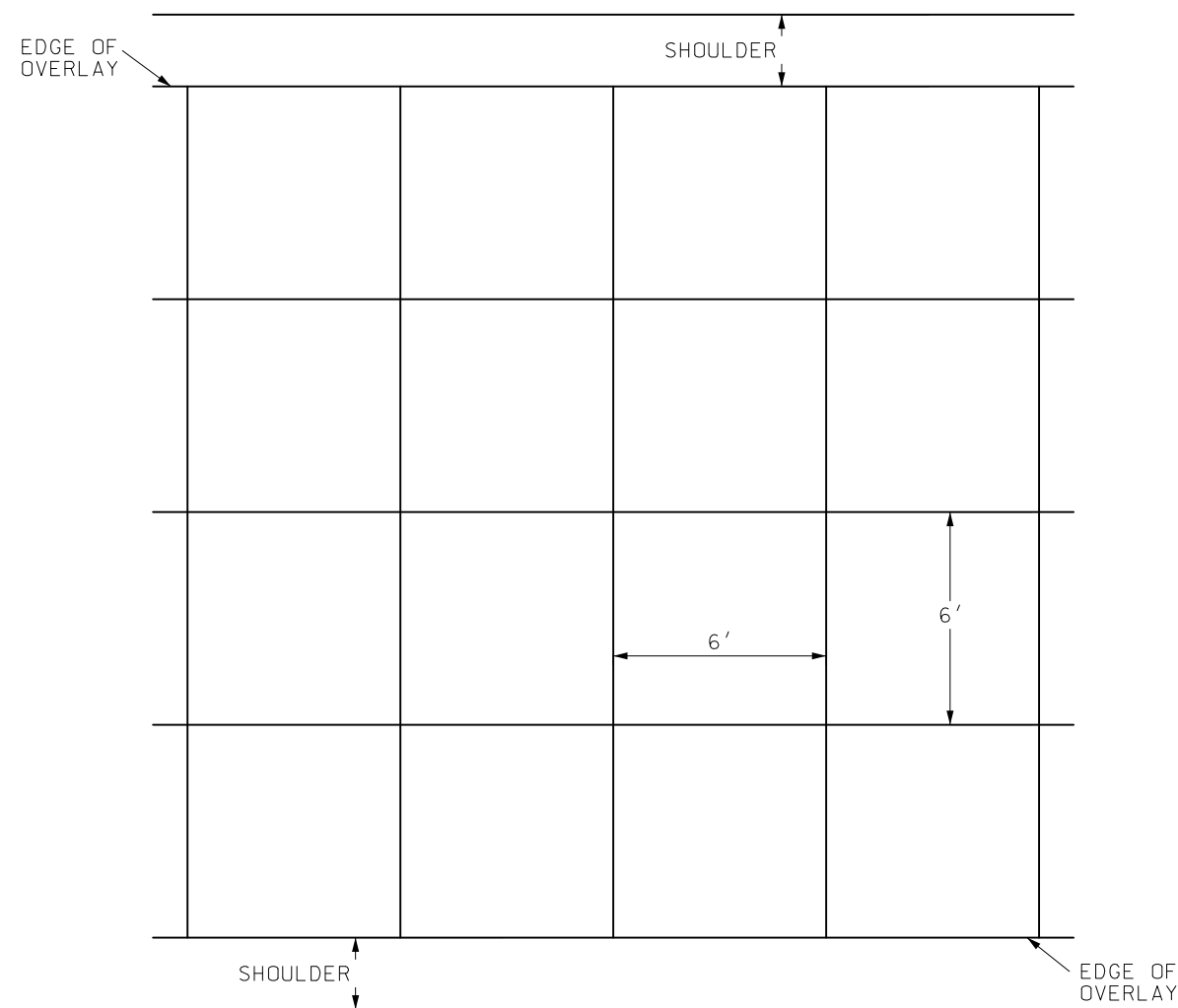
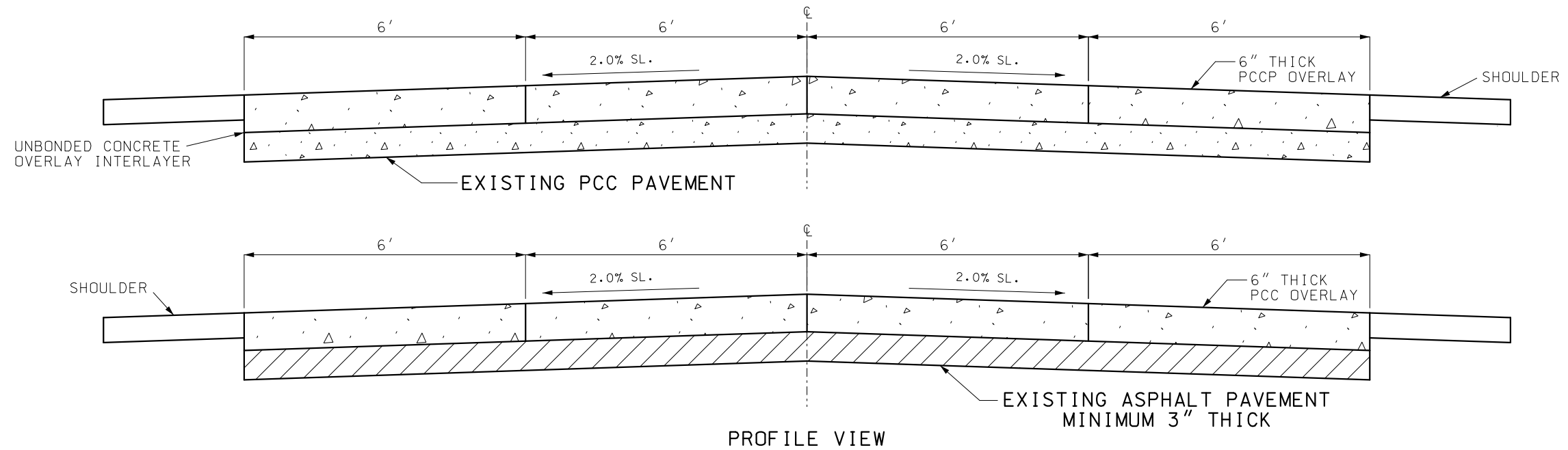
\*\* TOP OF SLEEPER SLAB MAY BE FLAT OR CROWNED. SEE BRIDGE PLANS.

FOR LOCATIONS OF SECTIONS A-A, B-B AND C-C, SEE SHEETS 1 AND 2.

GENERAL NOTES:

SEE STANDARD DRAWING 605.10 FOR PIPE OUTLET DETAIL FROM SHOULDER POINT TO INSLOPE.

|                                                                                                                                                                                                                                                         |                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                        |                                                        |
|  <p>STATE OF MISSOURI<br/>TRAVIS D. KOESTNER<br/>NUMBER PE-30042<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>CONCRETE APPROACH PAVEMENT (MAJOR ROUTE)</b></p> |
| DATE EFFECTIVE: 10/01/2022<br>DATE PREPARED: 7/19/2022                                                                                                                                                                                                  | <p><b>504.00L</b></p>                                  |
| SHEET NO. 3 OF 3                                                                                                                                                                                                                                        |                                                        |

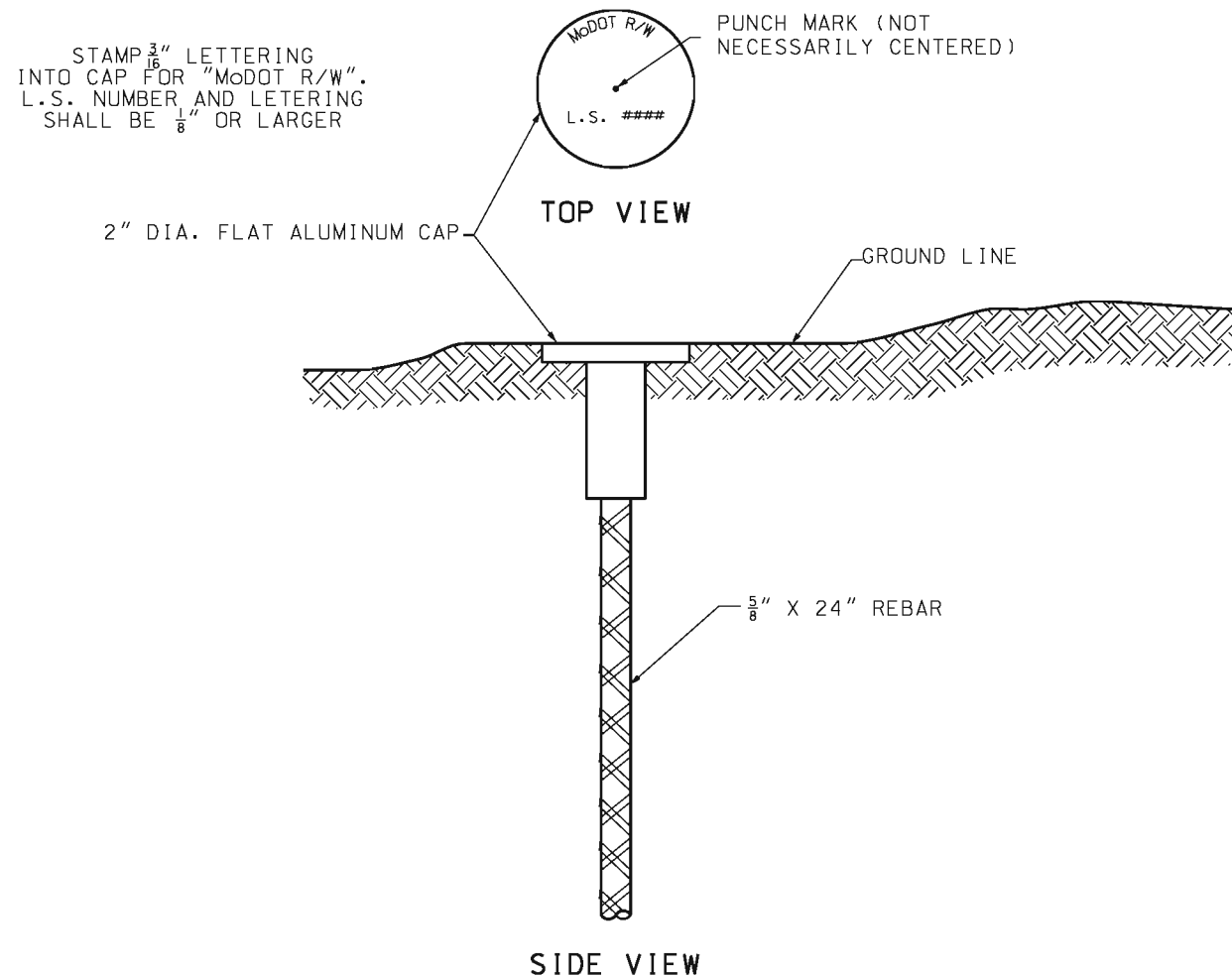


JOINT LAYOUT

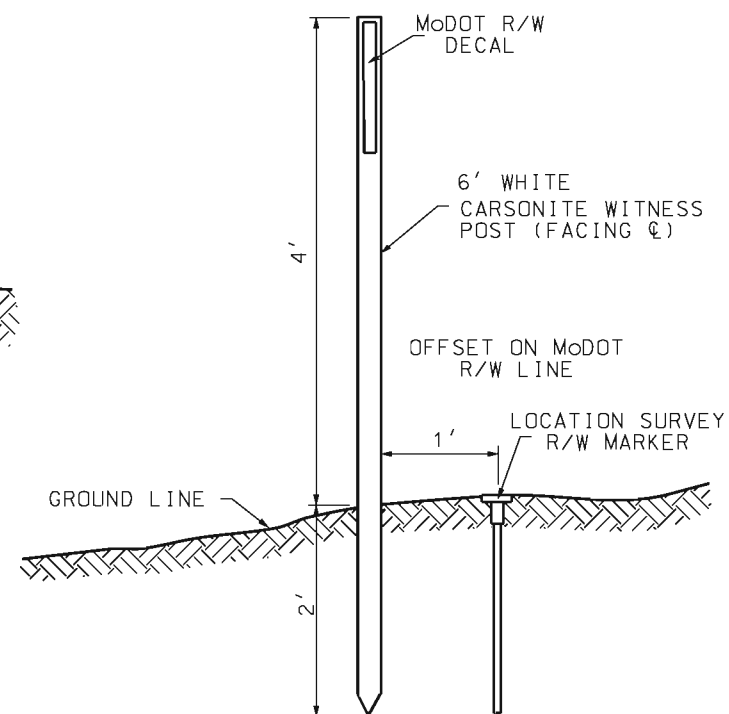
GENERAL NOTES:

CONCRETE OVERLAY DESIGN THICKNESS WILL VARY BASED ON TRAFFIC VOLUMES, BUT WILL TYPICALLY RANGE FROM 5 1/2" TO 6". THE CONSTRUCTION AND MATERIALS PAVEMENT SECTION WILL DETERMINE THE DESIGN THICKNESS.

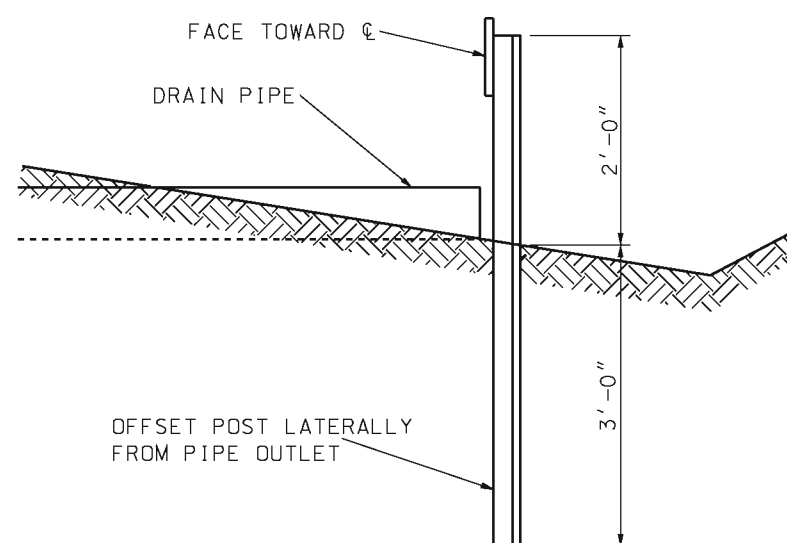
|                                                                                                                                                                                                                                  |                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                            |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>BIG BLOCK UNBONDED CONCRETE OVERLAY</b> |
| DATE EFFECTIVE: 07/01/2021<br>DATE PREPARED: 4/29/2021                                                                                                                                                                           | <b>506.20</b>                              |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                            |



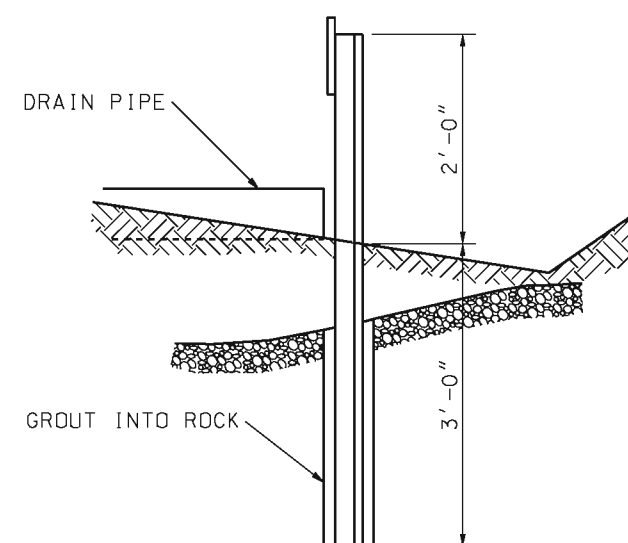
LOCATION SURVEY RIGHT-OF-WAY MARKER



WITNESS POST



IN EARTH



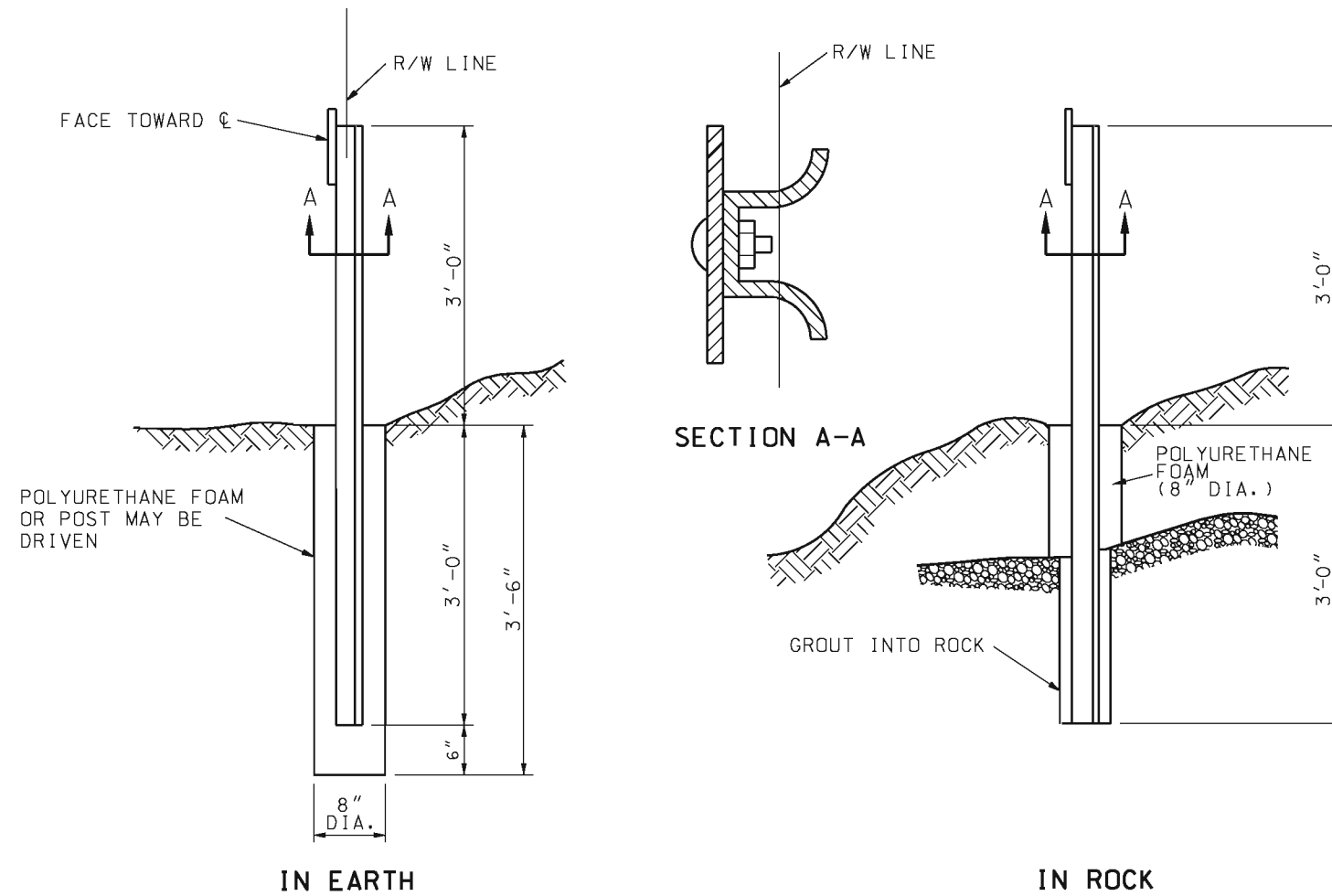
IN ROCK

DRAIN MARKER

GENERAL NOTES:

WHEN STEEL AND LOCATION SURVEY R/W MARKERS ARE NOT SUITABLE DUE TO NATURAL GROUND FEATURES OR MAN-MADE STRUCTURES, ALTERNATIVE MONUMENTATION (IN COMPLIANCE WITH THE APPROVED MONUMENTATION, AS SPECIFIED BY THE MISSOURI MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS) MAY BE SET.

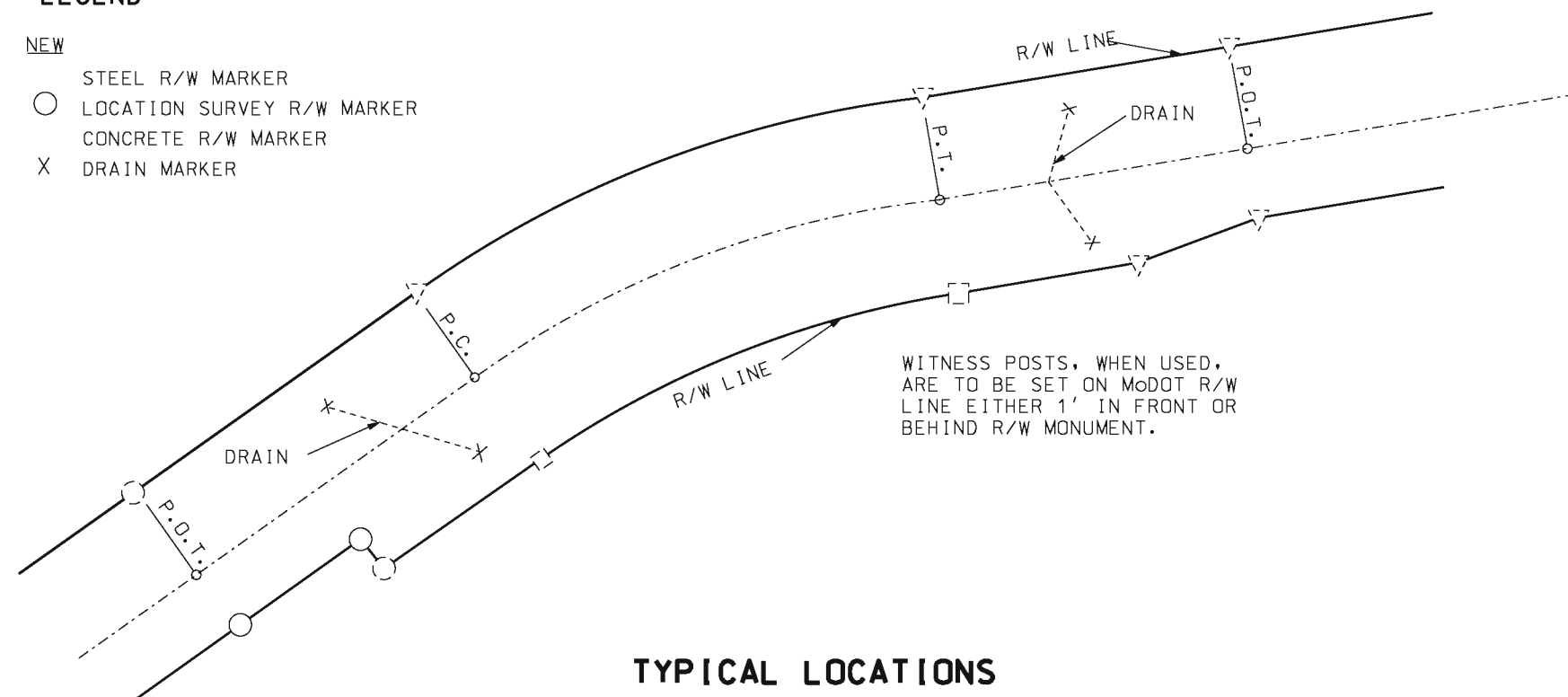
|                                                                                                                                                                        |                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                |                                              |
| <p>STATE OF MISSOURI<br/>KATHRYN PHILLIPS HARVEY<br/>NUMBER PE-23751<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>RIGHT-OF-WAY AND DRAIN MARKERS</b></p> |
| <p>DATE EFFECTIVE: 01/01/2003</p> <p>DATE PREPARED: 8/21/2009</p>                                                                                                      | <p>602.00D</p>                               |
| <p>SHEET NO. 1 OF 2</p>                                                                                                                                                |                                              |



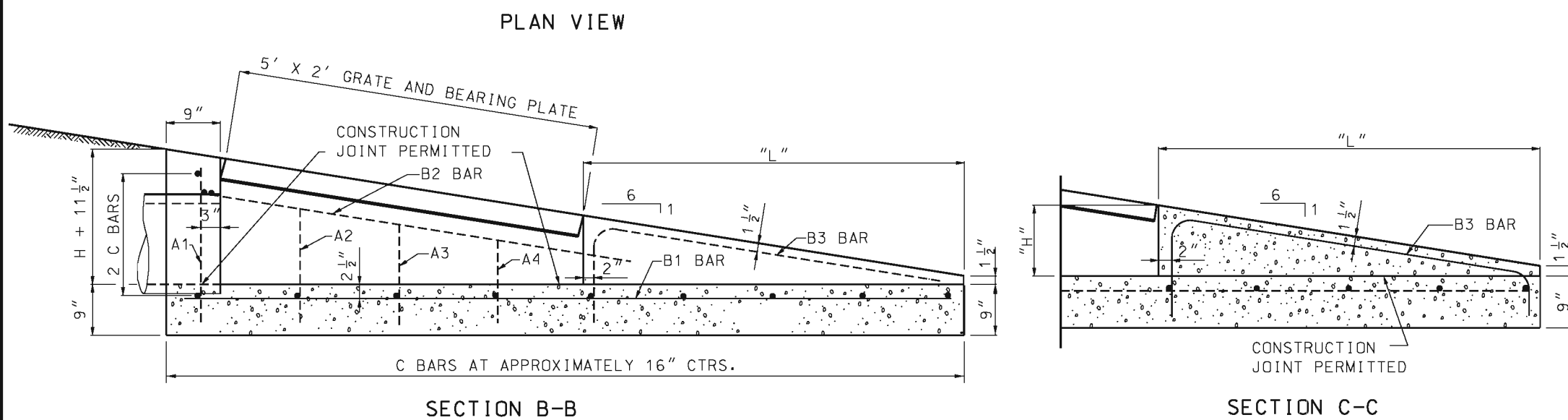
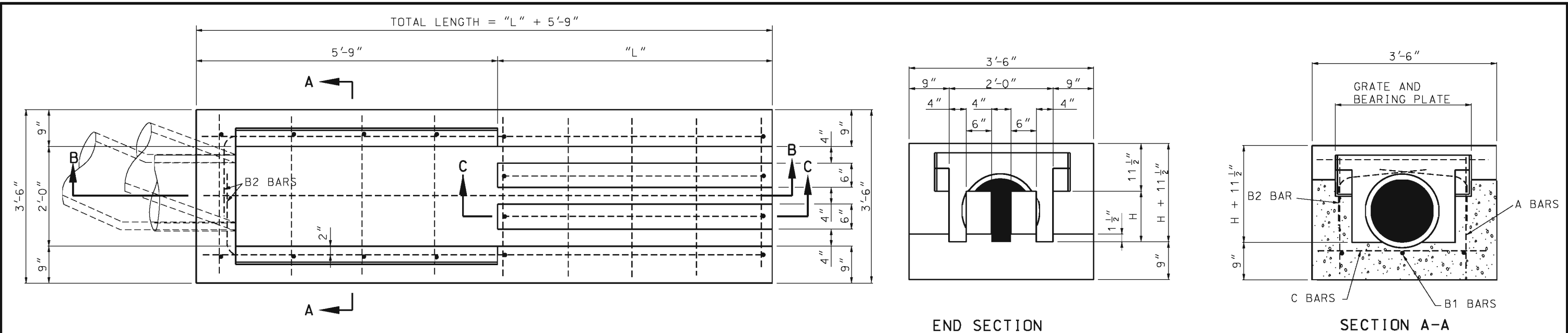
## STEEL RIGHT-OF-WAY MARKER

### LEGEND

| EXISTING   | NEW                        |
|------------|----------------------------|
| $\nabla$   | STEEL R/W MARKER           |
| $\bigcirc$ | LOCATION SURVEY R/W MARKER |
| $\square$  | CONCRETE R/W MARKER        |
| X          | DRAIN MARKER               |



|                                                        |  |                                                                                                                                            |  |
|--------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                        |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |
|                                                        |  | <b>RIGHT-OF-WAY AND DRAIN MARKERS</b>                                                                                                      |  |
| DATE EFFECTIVE: 01/01/2003<br>DATE PREPARED: 8/21/2009 |  | <b>602.00D</b>                                                                                                                             |  |
|                                                        |  | SHEET NO.<br>2 OF 2                                                                                                                        |  |



GENERAL NOTES:

USE RIGHT ANGLE HEADWALL FOR ALL INSTALLATIONS. SKEW PIPE BY USING A BEVELED END OR ELBOW ON PIPE. IN SPECIAL CASES, HEADWALL MAY BE TURNED TO FIT PIPE SKEW AND 1V TO 6H SLOPE WARPED TO FIT HEADWALL.

ALL CONCRETE SHALL BE CLASS "B".

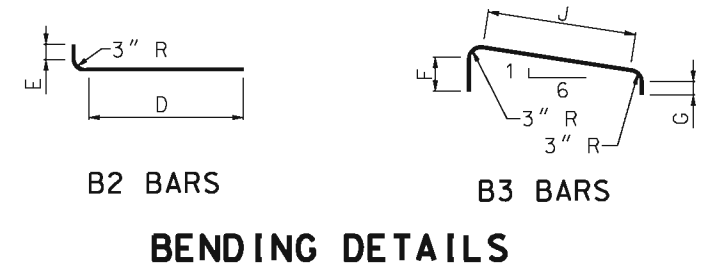
THIS DRAWING AND THE CONCRETE QUANTITIES SHOWN ARE BASED ON THE USE OF CONCRETE PIPE. QUANTITIES OF CONCRETE SHOWN WILL BE USED FOR PAYMENT REGARDLESS OF ANY QUANTITY CHANGES NECESSARY DUE TO THE USE OF ANY OTHER TYPE PIPE SPECIFIED OR PERMITTED.

FLOW LINE OF HEADWALL IS TO BE PLACED HORIZONTALLY.

PRECAST NOTES:

THE CONTRACTOR MAY, SUBJECT TO APPROVAL OF THE ENGINEER, FURNISH PRECAST UNITS IN LIEU OF CAST-IN-PLACE. IF A PRECAST UNIT IS FURNISHED, IT SHALL CONFORM IN ALL RESPECTS TO THE THE REQUIREMENTS FOR CAST-IN-PLACE UNITS INCLUDING DIMENSIONS AND REINFORCEMENT, EXCEPT THAT THE FORMS MAY BE TAPERED TO FACILITATE REMOVAL OF THE UNIT FROM THE FORMS. SHOP DRAWINGS OF THE PRECAST UNIT SHALL BE SUBMITTED FOR APPROVAL PRIOR TO FIRST USE OF THE PRECASTING FORMS.

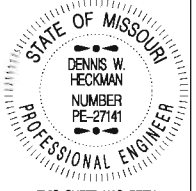
| PIPE<br>SIZE | DIMENSIONS |       |                 | QUANTITIES     |               | REINFORCING |        |            |        |            |        |            |        |            |        |            |       |       |            |     |        |    |           |        |     |        |
|--------------|------------|-------|-----------------|----------------|---------------|-------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|-------|-------|------------|-----|--------|----|-----------|--------|-----|--------|
|              | "H"        | "L "  | TOTAL<br>LENGTH | CONC.<br>C. Y. | STEEL<br>LBS. | #4 A1 BARS  |        | #4 A2 BARS |        | #4 A3 BARS |        | #4 A4 BARS |        | #4 B1 BARS |        | #4 B2 BARS |       |       | #4 B3 BARS |     |        |    | #4 C BARS |        |     |        |
|              |            |       |                 |                |               | NO.         | LENGTH | NO.        | LENGTH | NO.        | LENGTH | NO.        | LENGTH | NO.        | LENGTH | NO.        | E     | D     | LENGTH     | NO. | F      | G  | J         | LENGTH | NO. | LENGTH |
| 12"          | 9"         | 3'-9" | 9'-6"           | 1.5            | 70            | 2           | 2'-0"  | 2          | 1'-6"  | 2          | 1'-3"  | 2          | 1'-0"  | 3          | 9'-3"  | 2          | 1'-5" | 5'-8" | 7'-6"      | 4   | 11"    | 5" | 2'-11"    | 5'-0"  | 8   | 3'-3"  |
| 15"          | 1'-0"      | 5'-3" | 11'-0"          | 1.8            | 80            | 2           | 2'-3"  | 2          | 1'-9"  | 2          | 1'-6"  | 2          | 1'-3"  | 3          | 10'-9" | 2          | 1'-5" | 5'-8" | 7'-6"      | 4   | 1'-2"  | 5" | 4'-5"     | 6'-9"  | 9   | 3'-3"  |
| 18"          | 1'-3"      | 6'-9" | 12'-6"          | 2.2            | 90            | 2           | 2'-6"  | 2          | 2'-0"  | 2          | 1'-9"  | 2          | 1'-6"  | 3          | 12'-3" | 2          | 1'-5" | 5'-8" | 7'-6"      | 4   | 1'-5"  | 5" | 5'-11"    | 8'-6"  | 10  | 3'-3"  |
| 21"          | 1'-6"      | 8'-3" | 14'-0"          | 2.6            | 100           | 2           | 2'-9"  | 2          | 2'-3"  | 2          | 2'-0"  | 2          | 1'-9"  | 3          | 13'-9" | 2          | 1'-5" | 5'-8" | 7'-6"      | 4   | 1'-8"  | 5" | 7'-5"     | 10'-3" | 11  | 3'-3"  |
| 24"          | 1'-9"      | 9'-9" | 15'-6"          | 3.0            | 110           | 2           | 3'-0"  | 2          | 2'-6"  | 2          | 2'-3"  | 2          | 2'-0"  | 3          | 15'-3" | 2          | 1'-5" | 5'-8" | 7'-6"      | 4   | 1'-11" | 5" | 8'-11"    | 12'-0" | 12  | 3'-3"  |





MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
DENNIS W. HECKMAN  
NUMBER PE-27141  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

**PIPE CULVERT HEADWALLS**

TYPE S

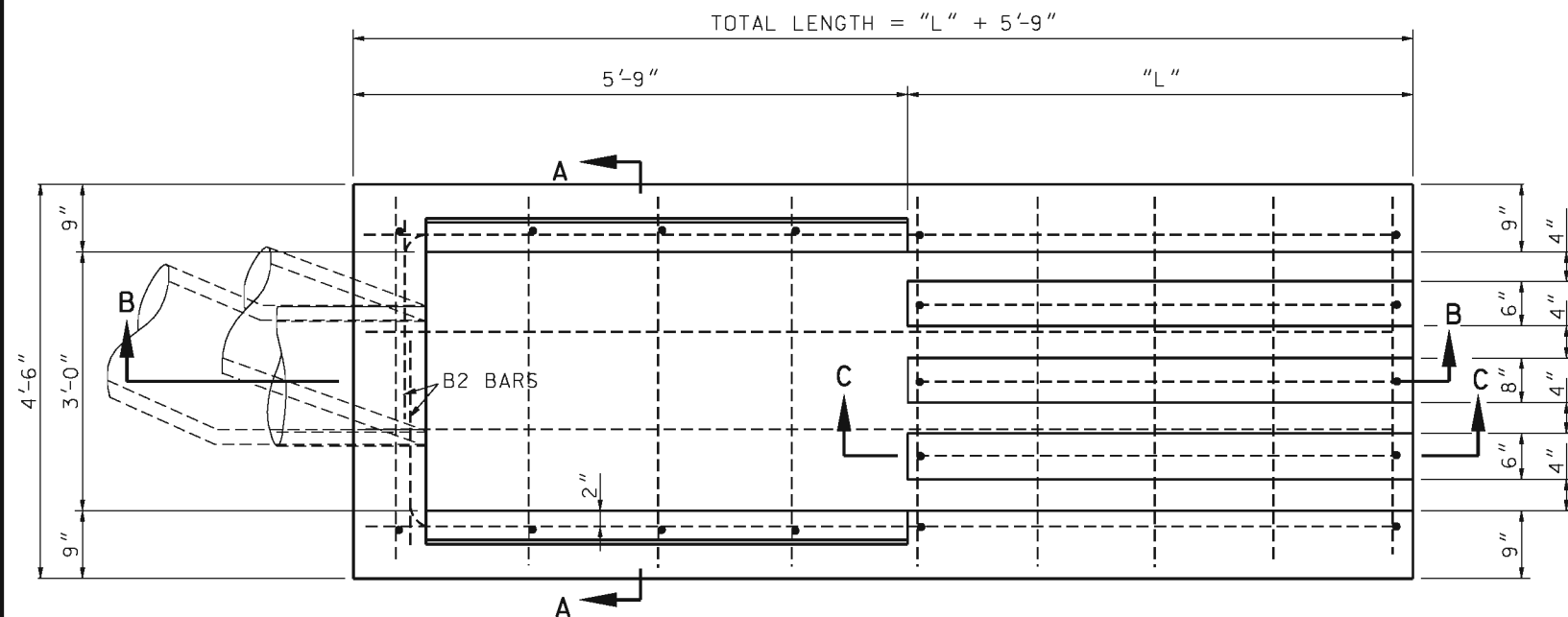
12" TO 24" DIAMETERS

- 1V:6H SLOPES

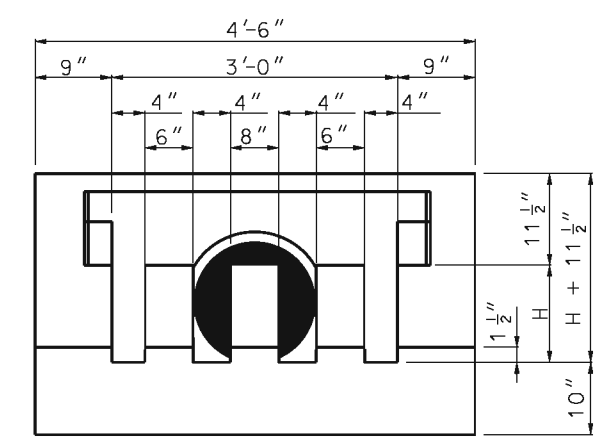
|                 |            |         |                     |
|-----------------|------------|---------|---------------------|
| DATE EFFECTIVE: | 08/01/2006 | 604.05D | SHEET NO.<br>1 OF 2 |
| DATE PREPARED:  | 9/3/2009   |         |                     |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

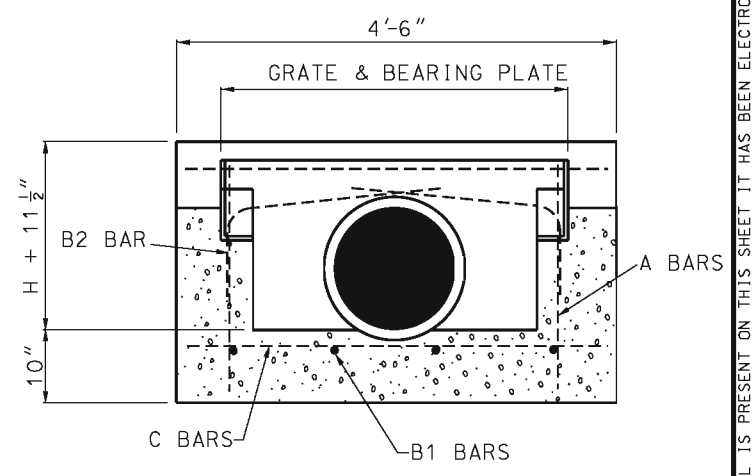




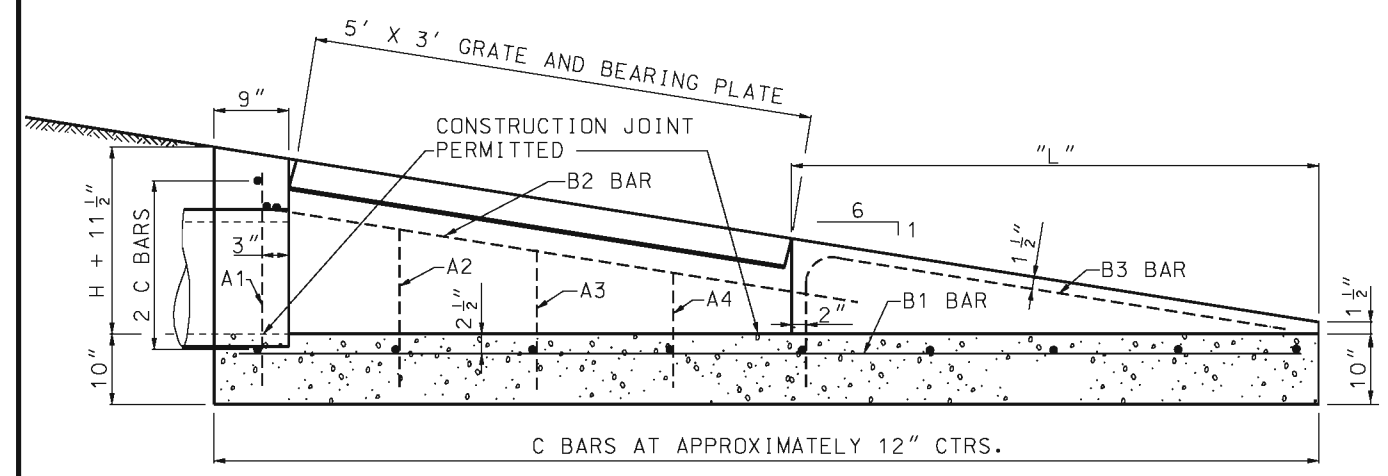
PLAN VIEW



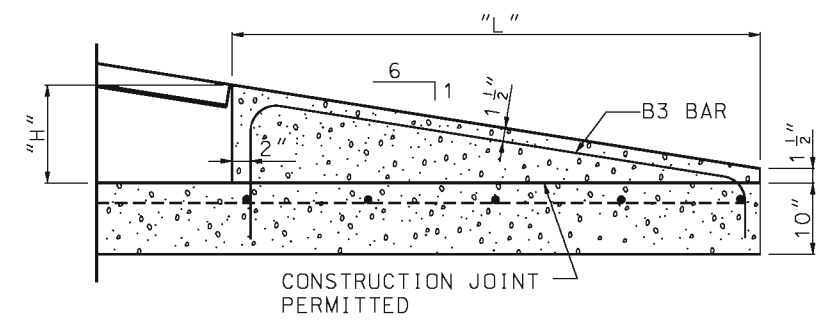
END SECTION



SECTION A-A

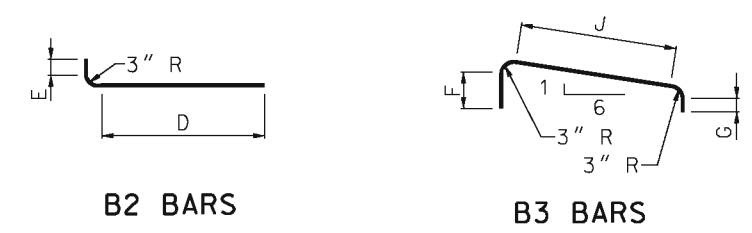


SECTION B-B



SECTION C-C

| PIPE<br>SIZE | DIMENSIONS |        |                 | QUANTITIES     |               | REINFORCING |        |            |        |            |        |            |        |            |        |            |        |       |            |     |        |    |         |           |     |        |
|--------------|------------|--------|-----------------|----------------|---------------|-------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|-------|------------|-----|--------|----|---------|-----------|-----|--------|
|              | "H"        | "L "   | TOTAL<br>LENGTH | CONC.<br>C. Y. | STEEL<br>LBS. | #4 A1 BARS  |        | #4 A2 BARS |        | #4 A3 BARS |        | #4 A4 BARS |        | #4 B1 BARS |        | #4 B2 BARS |        |       | #4 B3 BARS |     |        |    |         | #4 C BARS |     |        |
|              |            |        |                 |                |               | NO.         | LENGTH | NO.        | LENGTH | NO.        | LENGTH | NO.        | LENGTH | NO.        | LENGTH | NO.        | E      | D     | LENGTH     | NO. | F      | G  | J       | LENGTH    | NO. | LENGTH |
| 27"          | 2'-0"      | 11'-3" | 17'-0"          | 4.5            | 160           | 2           | 3'-3"  | 2          | 2'-9"  | 2          | 2'-6"  | 2          | 2'-3"  | 4          | 16'-9" | 2          | 1'-11" | 5'-8" | 8'-0"      | 5   | 2'-2"  | 5" | 10'-5"  | 13'-9"    | 18  | 4'-3"  |
| 30"          | 2'-3"      | 12'-9" | 18'-6"          | 5.0            | 170           | 2           | 3'-6"  | 2          | 3'-0"  | 2          | 2'-9"  | 2          | 2'-6"  | 4          | 18'-3" | 2          | 1'-11" | 5'-8" | 8'-0"      | 5   | 2'-5"  | 5" | 11'-11" | 15'-6"    | 19  | 4'-3"  |
| 36"          | 2'-9"      | 15'-9" | 21'-6"          | 6.1            | 200           | 2           | 4'-0"  | 2          | 3'-6"  | 2          | 3'-3"  | 2          | 3'-0"  | 4          | 21'-3" | 2          | 1'-11" | 5'-8" | 8'-0"      | 5   | 2'-11" | 5" | 14'-11" | 19'-0"    | 21  | 4'-3"  |



BENDING DETAILS

GENERAL NOTES:

SEE GENERAL NOTES ON SHEET 1.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PIPE CULVERT HEADWALLS**

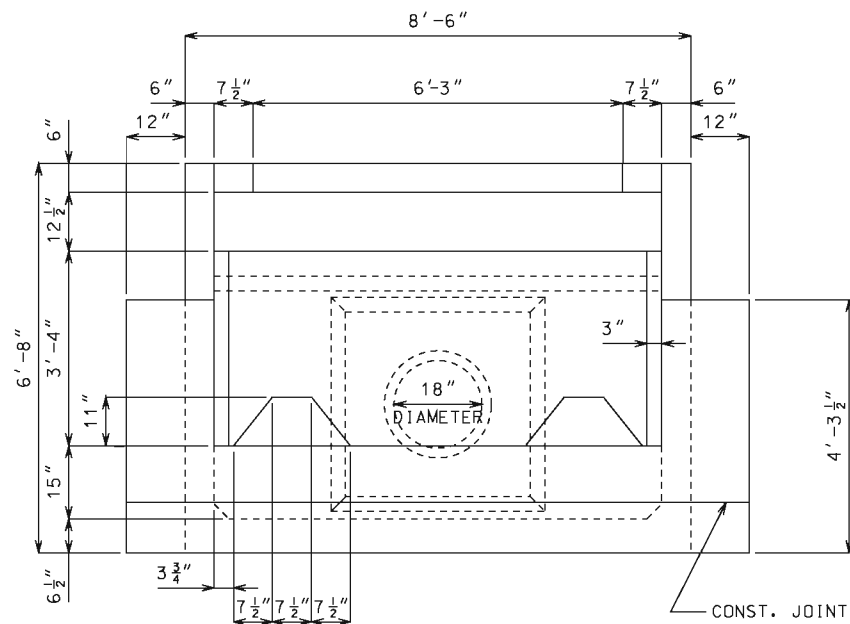
TYPE S  
27" TO 36" DIAMETERS  
- 1V:6H SLOPES

DATE EFFECTIVE: 08/01/2006  
DATE PREPARED: 9/3/2009

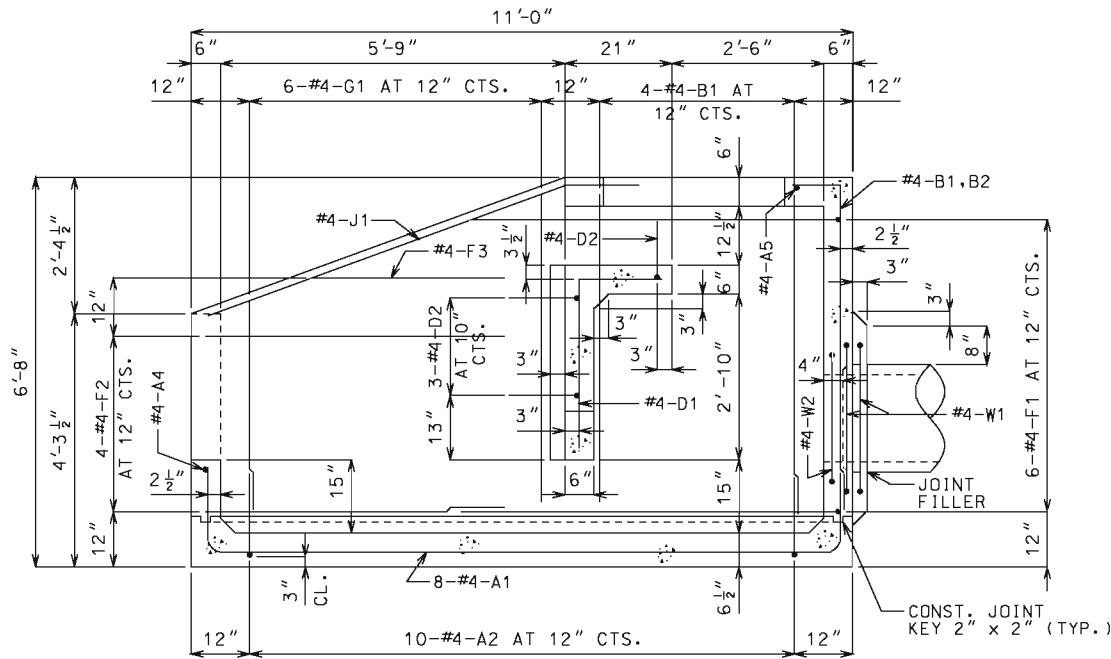
**604.05D**

SHEET NO.  
2 OF 2

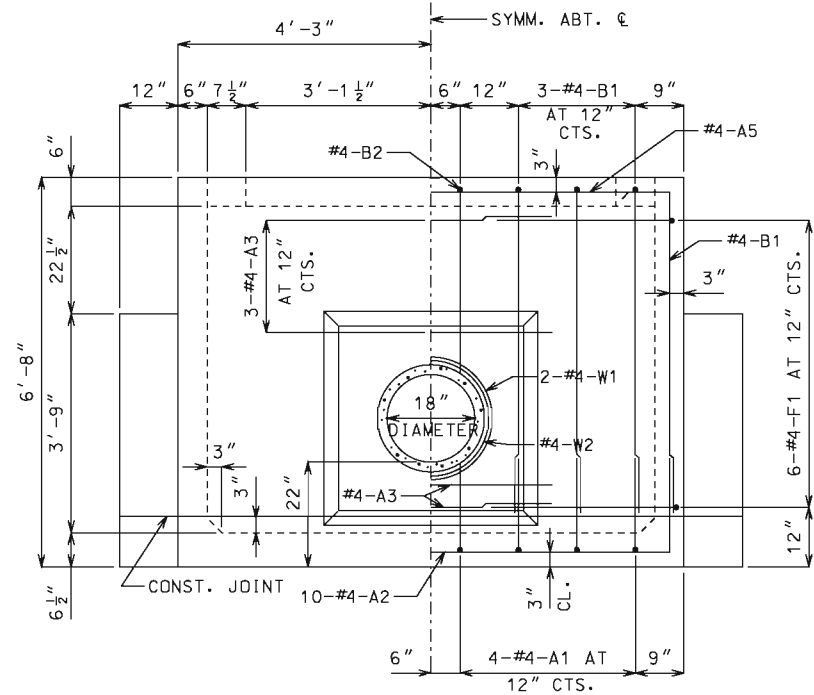
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



DOWNSTREAM ELEVATION



SECTION A - A



UPSTREAM ELEVATION

NOTE: BEND OR CUT A1 BARS IN FIELD TO CLEAR PIPE.

GENERAL NOTES:

DESIGN UNIT STRESSES

CLASS B CONCRETE  $f'_c = 3,000$  psi  
REINFORCING STEEL (GRADE 60)  $f_y = 60,000$  psi

REINFORCING STEEL

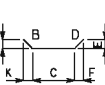
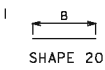
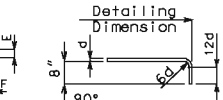
MINIMUM CLEARANCE TO REINFORCING STEEL  
SHALL BE  $1\frac{1}{2}$ " UNLESS SHOWN OTHERWISE.

DIMENSIONS

DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS.

| ESTIMATED QUANTITIES |         |     |       |
|----------------------|---------|-----|-------|
| ITEM                 |         |     | TOTAL |
| CLASS B CONCRETE     | CU. YD. | 6.1 |       |
| REINFORCING STEEL    | LBS.    | 490 |       |

| COMPLETE BILL OF REINFORCING STEEL |       |          |           |            |          |            |                            |         |          |          |          |          | BENDING DIAGRAMS |                |               |        |
|------------------------------------|-------|----------|-----------|------------|----------|------------|----------------------------|---------|----------|----------|----------|----------|------------------|----------------|---------------|--------|
| NO.                                | REQ'D | MARK NO. | SHAPE NO. | VARIES (V) | NO. EACH | DIMENSIONS |                            |         |          |          |          |          |                  | NOMINAL LENGTH | ACTUAL LENGTH | WEIGHT |
|                                    |       |          |           |            |          | B          | C                          | D       | E        | F        | H        | K        |                  |                |               |        |
|                                    |       | SIZE     | MARK      |            |          | FT. IN.    | FT. IN.                    | FT. IN. | FT. IN.  | FT. IN.  | FT. IN.  | FT. IN.  | FT. IN.          | FT. IN.        | LBS.          |        |
| 8                                  | 4     | A1       | 11        |            |          |            | 0-16 1/2                   | 10-7    | 0-17 1/2 |          |          |          | 13-5             | 13-3           | 71            |        |
| 10                                 | 4     | A2       | 11        |            |          |            | 0-18 1/2                   | 8-0     | 0-18 1/2 |          |          |          | 11-1             | 10-10          | 72            |        |
| 5                                  | 4     | A3       | 20        |            |          | 4-6        |                            |         |          |          |          |          | 4-6              | 4-6            | 15            |        |
| 1                                  | 4     | A4       | 20        |            |          | 10-3       |                            |         |          |          |          |          | 10-3             | 10-3           | 7             |        |
| 1                                  | 4     | A5       | 20        |            |          | 8-3        |                            |         |          |          |          |          | 8-3              | 8-3            | 6             |        |
| 14                                 | 4     | B1       | 19        |            |          | 5-9        | 0-9                        |         |          |          |          |          | 6-6              | 6-4            | 59            |        |
| 2                                  | 4     | B2       | 19        |            |          | 2-11       | 0-9                        |         |          |          |          |          | 3-8              | 3-6            | 5             |        |
| 7                                  | 4     | D1       | 19        |            |          | 2-11       | 0-16                       |         |          |          |          |          | 4-3              | 4-2            | 19            |        |
| 4                                  | 4     | D2       | 11        |            |          |            | 0-20 1/2                   | 8-0     | 0-20 1/2 |          |          |          | 11-5             | 11-3           | 30            |        |
| 1                                  | 4     | D3       | 15        |            |          | 2-1 1/2    | 2-11 1/2                   | 2-1 1/2 | 0-21 3/8 | 0-13 1/2 | 0-21 3/8 | 0-13 1/2 | 7-3              | 7-2            | 5             |        |
| 2                                  | 4     | D4       | 14        |            |          | 0-12       | 0-6                        | 2-1 1/2 |          |          | 0-21 3/8 | 0-13 1/2 | 3-8              | 3-6            | 5             |        |
| 2                                  | 4     | E1       | 23        |            |          | 0-13       | 4-0 3/8                    |         |          |          | 0-9 3/8  | 0-9      | 5-1              | 5-1            | 7             |        |
| 12                                 | 4     | F1       | 19        |            |          | 2-10 1/2   | 6-4 1/8                    |         |          |          |          |          | 9-3              | 9-1            | 73            |        |
| 8                                  | 4     | F2       | 19        |            |          | 0-13       | 5-9                        |         |          |          |          |          | 6-10             | 6-9            | 36            |        |
| 2                                  | 4     | F3       | 20        |            |          | 4-0        |                            |         |          |          |          |          | 4-0              | 4-0            | 5             |        |
| 12                                 | 4     | G1       | 20        | V          | 2        | 5-8        |                            |         |          |          |          |          | 5-8              | 5-8            |               |        |
|                                    |       |          |           |            |          | 3-9        | (INCREMENT = 4 3/8 INCHES) |         |          |          |          |          | 3-9              | 3-9            | 38            |        |
| 2                                  | 4     | J1       | 20        |            |          | 7-5        |                            |         |          |          |          |          | 7-5              | 7-5            | 10            |        |
| 2                                  | 4     | J2       | 19        |            |          | 3-10 3/4   | 2-1 1/2                    |         |          |          |          |          | 6-0              | 5-11           | 8             |        |
| 2                                  | 4     | W1       | 16        |            |          | 2-4        |                            |         |          |          |          |          | 8-2              | 8-2            | 11            |        |
| 1                                  | 4     | W2       | 16        |            |          | 0-23       |                            |         |          |          |          |          | 6-11             | 6-11           | 5             |        |

|                                                                                       |                                                                                       |                                                                                       |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |
| SHAPE 11                                                                              | SHAPE 14                                                                              | SHAPE 15                                                                              |
|  |  |  |
| SHAPE 16                                                                              | SHAPE 19                                                                              | SHAPE 20                                                                              |
|  |  |                                                                                       |
| SHAPE 23                                                                              | STANDARD HOOKS                                                                        |                                                                                       |

ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEG. TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEG. STANDARD HOOKS.

HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

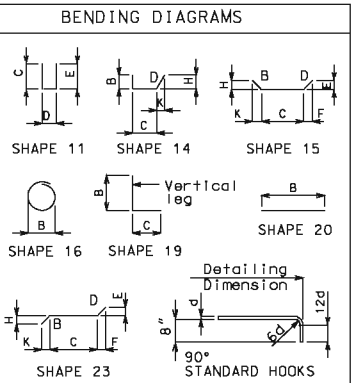
NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

LENGTH = TOTAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.

V = BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.

NO.EA. = NUMBER OF BARS OF EACH LENGTH.



ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEG. TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEG. STANDARD HOOKS.

HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

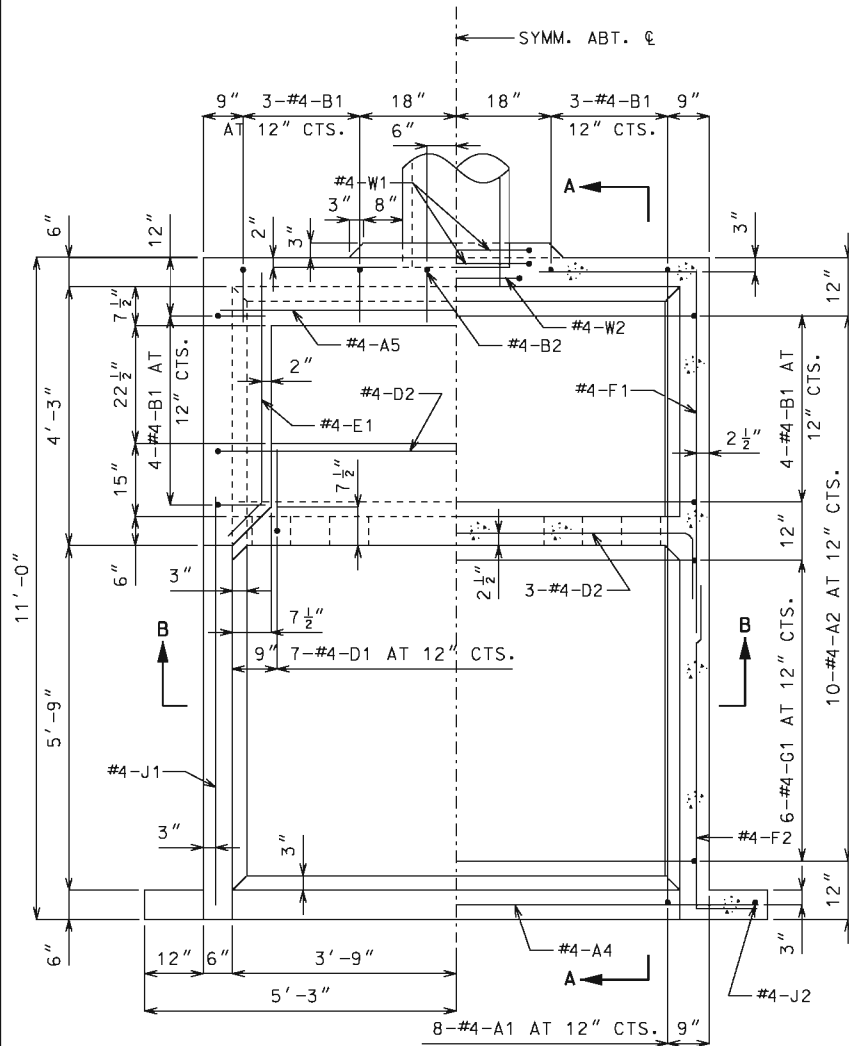
NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

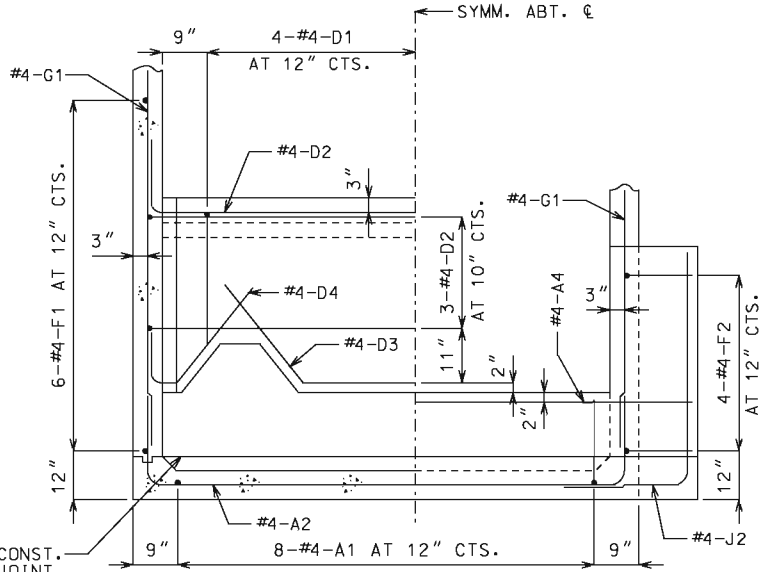
LENGTH = TOTAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.

V - BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.

NO.EA. = NUMBER OF BARS OF EACH LENGTH.



HALF PLAN HALF HORIZONTAL SECTION



HALF ELEVATION OF LOWER BAFFLE AND WING

NOTE: BEND OR CUT D1 BARS IN FIELD TO CLEAR NOTCH IN BAFFLE WALL.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

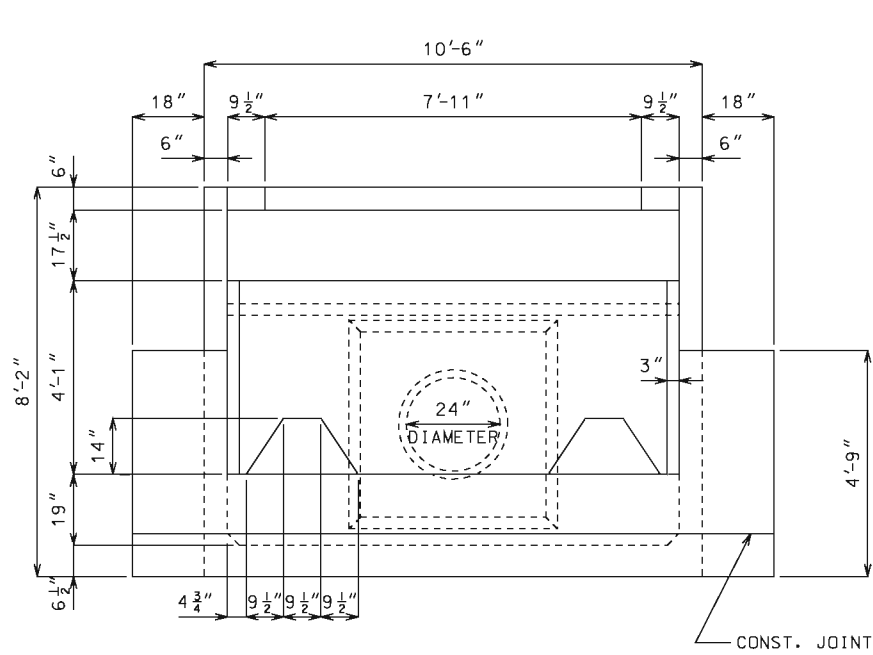
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PIPE CULVERT HEADWALL**  
ENERGY DISSIPATOR (IMPACT TYPE)  
FOR 18" CONCRETE PIPE

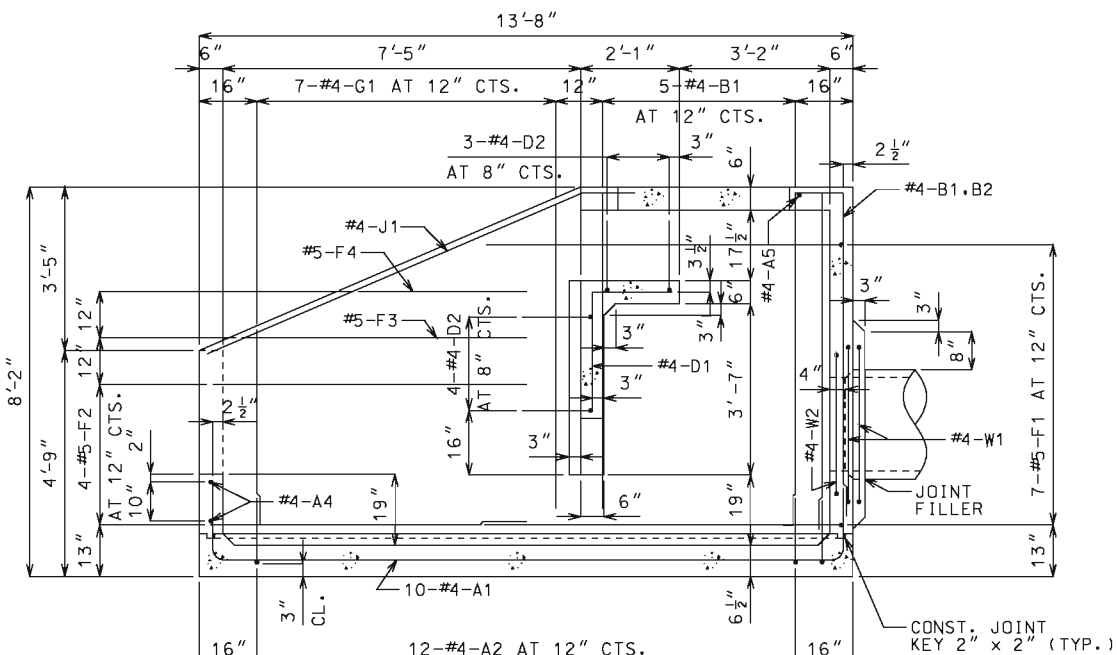
DATE EFFECTIVE: 07/01/2001  
DATE PREPARED: 9/3/2009

**604.10E**

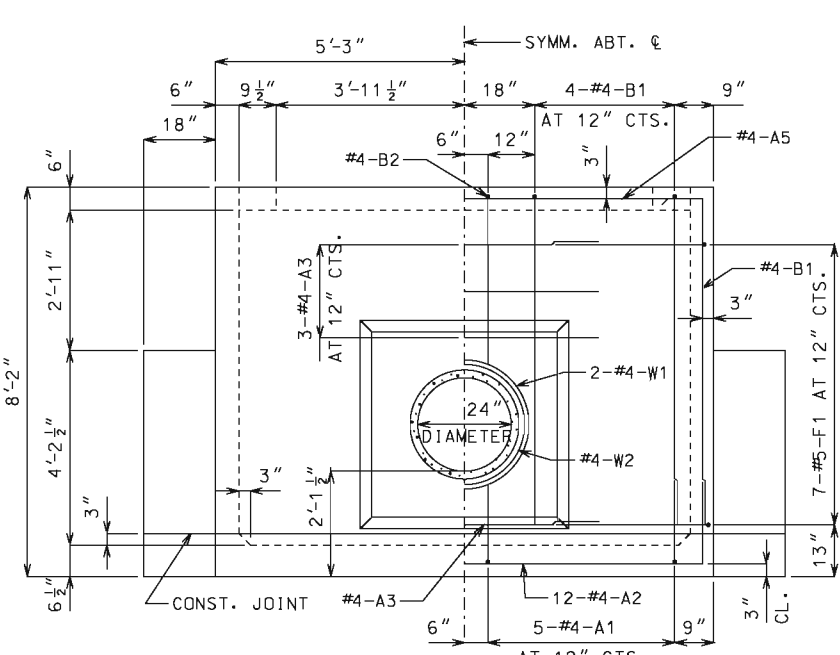
SHEET NO.  
1 OF 1



DOWNSTREAM ELEVATION

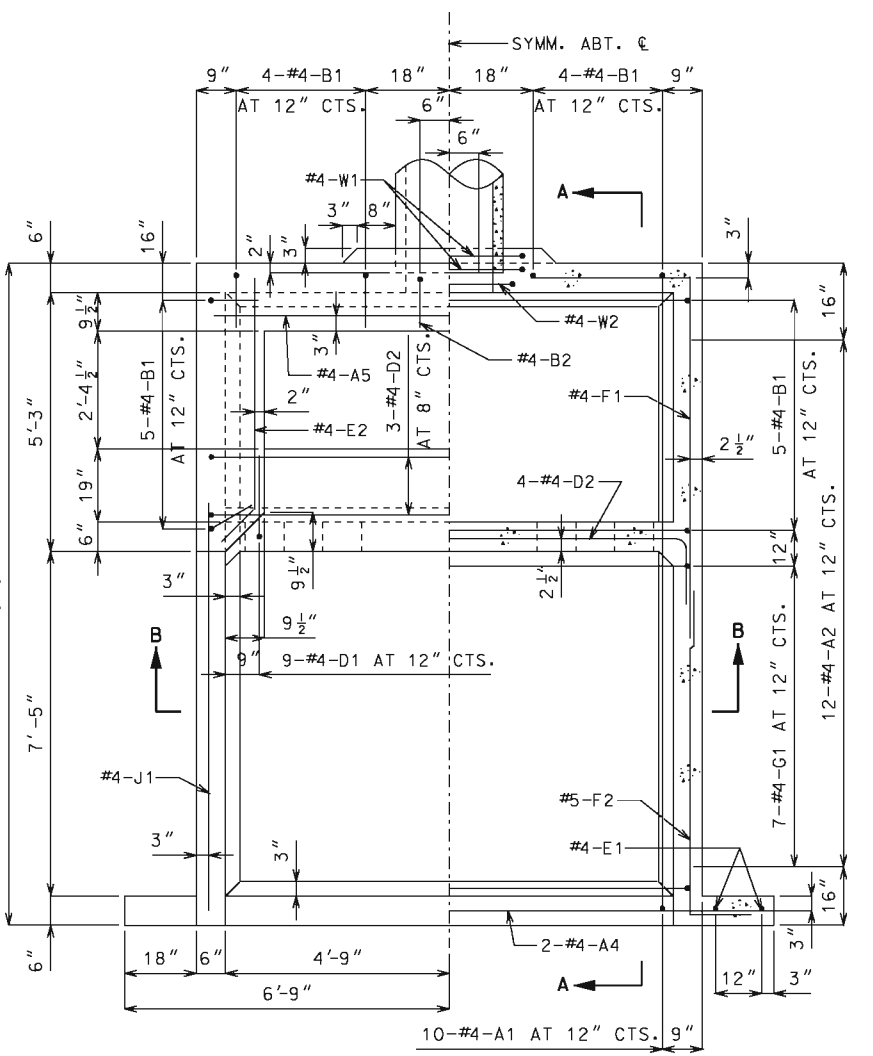


SECTION A - A



UPSTREAM ELEVATION

NOTE: BEND OR CUT A1 BARS IN FIELD TO CLEAR PIPE.



HALF PLAN HALF HORIZONTAL SECTION

GENERAL NOTES:

DESIGN UNIT STRESSES

CLASS B CONCRETE  $f'c = 3,000$  psi  
REINFORCING STEEL (GRADE 60)  $fy = 60,000$  psi

REINFORCING STEEL

MINIMUM CLEARANCE TO REINFORCING STEEL  
SHALL BE  $1\frac{1}{2}$ " UNLESS SHOWN OTHERWISE.

DIMENSIONS

DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS.

| ESTIMATED QUANTITIES |         |       |
|----------------------|---------|-------|
| ITEM                 |         | TOTAL |
| CLASS B CONCRETE     | CU. YD. | 9.5   |
| REINFORCING STEEL    | LBS.    | 820   |

| COMPLETE BILL OF REINFORCING STEEL |       |          |           |            |          |                   |                                      |                    |                    |                    |                   |                    |         | BENDING DIAGRAMS |               |        |
|------------------------------------|-------|----------|-----------|------------|----------|-------------------|--------------------------------------|--------------------|--------------------|--------------------|-------------------|--------------------|---------|------------------|---------------|--------|
| NO.                                | REQ'D | MARK NO. | SHAPE NO. | VARIES (V) | NO. EACH | DIMENSIONS        |                                      |                    |                    |                    |                   |                    |         | NOMINAL LENGTH   | ACTUAL LENGTH | WEIGHT |
|                                    |       |          |           |            |          | B                 | C                                    | D                  | E                  | F                  | H                 | K                  |         |                  |               |        |
|                                    | SIZE  | MARK     |           |            |          | FT. IN.           | FT. IN.                              | FT. IN.            | FT. IN.            | FT. IN.            | FT. IN.           | FT. IN.            | FT. IN. | FT. IN.          | LBS.          |        |
| 10                                 | 4     | A1       | 11        |            |          |                   | 0-20 $\frac{1}{4}$                   | 13-2 $\frac{1}{2}$ | 0-17 $\frac{3}{4}$ |                    |                   |                    |         | 16-5             | 16-2          | 108    |
| 12                                 | 4     | A2       | 11        |            |          |                   | 0-18 $\frac{3}{4}$                   | 10-0               | 0-18 $\frac{3}{4}$ |                    |                   |                    |         | 13-2             | 12-11         | 104    |
| 4                                  | 4     | A3       | 20        |            |          | 5-0               |                                      |                    |                    |                    |                   |                    |         | 5-0              | 5-0           | 13     |
| 2                                  | 4     | A4       | 20        |            |          | 13-3              |                                      |                    |                    |                    |                   |                    |         | 13-3             | 13-3          | 18     |
| 1                                  | 4     | A5       | 20        |            |          | 10-3              |                                      |                    |                    |                    |                   |                    |         | 10-3             | 10-3          | 7      |
| 18                                 | 4     | B1       | 19        |            |          | 7-1 $\frac{1}{2}$ | 0-12                                 |                    |                    |                    |                   |                    |         | 8-2              | 8-0           | 96     |
| 2                                  | 4     | B2       | 19        |            |          | 3-8               | 0-10                                 |                    |                    |                    |                   |                    |         | 4-6              | 4-5           | 6      |
| 9                                  | 4     | D1       | 19        |            |          | 3-8               | 0-20 $\frac{1}{2}$                   |                    |                    |                    |                   |                    |         | 5-5              | 5-3           | 32     |
| 7                                  | 4     | D2       | 11        |            |          |                   | 0-19                                 | 10-1               | 0-19               |                    |                   |                    |         | 13-3             | 13-1          | 61     |
| 1                                  | 4     | D3       | 15        |            |          | 2-9 $\frac{1}{8}$ | 3-10                                 | 2-9 $\frac{1}{8}$  | 2-3 $\frac{1}{2}$  | 0-18 $\frac{1}{2}$ | 2-3 $\frac{1}{2}$ | 0-18 $\frac{1}{2}$ |         | 9-4              | 9-3           | 6      |
| 2                                  | 4     | D4       | 14        |            |          | 0-12              | 0-7                                  | 2-9 $\frac{1}{8}$  |                    |                    | 2-3 $\frac{1}{2}$ | 0-18 $\frac{1}{2}$ |         | 4-4              | 4-2           | 6      |
| 4                                  | 4     | E1       | 20        |            |          | 4-6               |                                      |                    |                    |                    |                   |                    |         | 4-6              | 4-6           | 12     |
| 2                                  | 4     | E2       | 23        |            |          | 0-17              | 5-0 $\frac{1}{2}$                    |                    |                    |                    | 0-12              | 0-12               |         | 6-6              | 6-5           | 9      |
| 2                                  | 4     | E3       | 20        |            |          | 2-8               |                                      |                    |                    |                    |                   |                    |         | 2-8              | 2-8           | 4      |
| 14                                 | 5     | F1       | 19        |            |          | 3-8               | 7-11                                 |                    |                    |                    |                   |                    |         | 11-7             | 11-6          | 168    |
| 8                                  | 5     | F2       | 19        |            |          | 0-19              | 7-0                                  |                    |                    |                    |                   |                    |         | 8-7              | 8-6           | 71     |
| 2                                  | 5     | F3       | 20        |            |          | 6-0               |                                      |                    |                    |                    |                   |                    |         | 6-0              | 6-0           | 13     |
| 2                                  | 5     | F4       | 20        |            |          | 3-9               |                                      |                    |                    |                    |                   |                    |         | 3-9              | 3-9           | 8      |
| 14                                 | 4     | G1       | 20        | V          | 2        | 6-8               |                                      |                    |                    |                    |                   |                    |         | 6-8              | 6-8           |        |
|                                    |       |          |           |            |          | 4-1               | (INCREMENT = 5 $\frac{1}{8}$ INCHES) |                    |                    |                    |                   |                    | 4-1     | 4-1              | 50            |        |
| 2                                  | 4     | J1       | 20        |            |          | 9-6               |                                      |                    |                    |                    |                   |                    |         | 9-6              | 9-6           | 13     |
| 2                                  | 4     | W1       | 16        |            |          | 2-9               |                                      |                    |                    |                    |                   |                    |         | 9-6              | 9-6           | 13     |
| 1                                  | 4     | W2       | 16        |            |          | 2-5               |                                      |                    |                    |                    |                   |                    |         | 8-6              | 8-6           | 6      |

SHAPE 11

SHAPE 14

SHAPE 15

SHAPE 16

SHAPE 19

SHAPE 20

SHAPE 23

STANDARD HOOKS

ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEG. TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEG. STANDARD HOOKS.

HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

LENGTH = TOTAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.

V - BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.

NO. EA. = NUMBER OF BARS OF EACH LENGTH.

ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEG. TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEG. STANDARD HOOKS.

HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

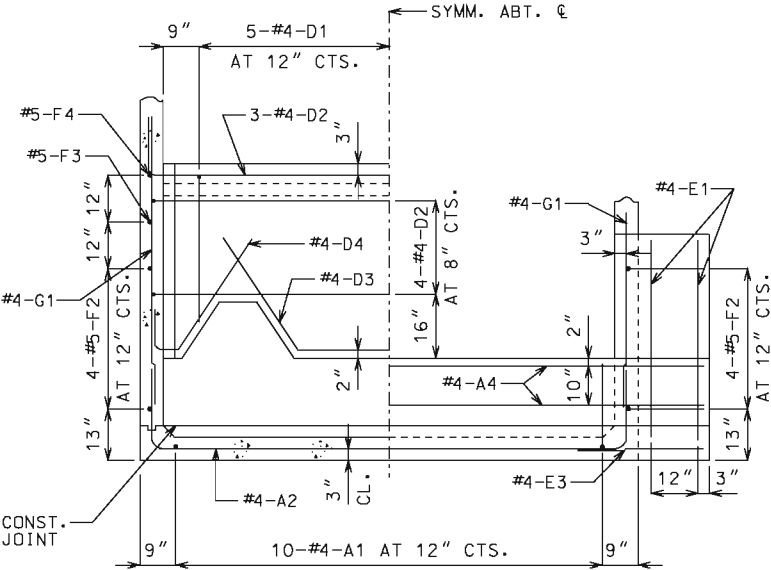
NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

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V = BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.

NO.EA. = NUMBER OF BARS OF EACH LENGTH.



HALF SECTION B-B HALF ELEVATION OF LOWER BAFFLE AND WING

NOTE: BEND OR CUT D1 BARS IN FIELD TO CLEAR NOTCH IN BAFFLE WALL.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

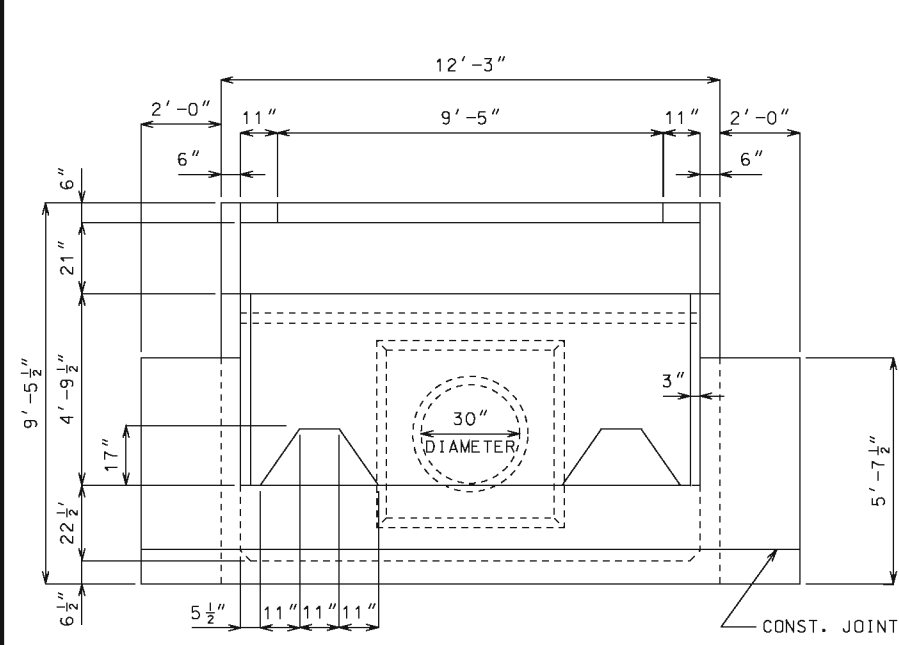
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PIPE CULVERT HEADWALL  
ENERGY DISSIPATOR (IMPACT TYPE)  
FOR 24" CONCRETE PIPE**

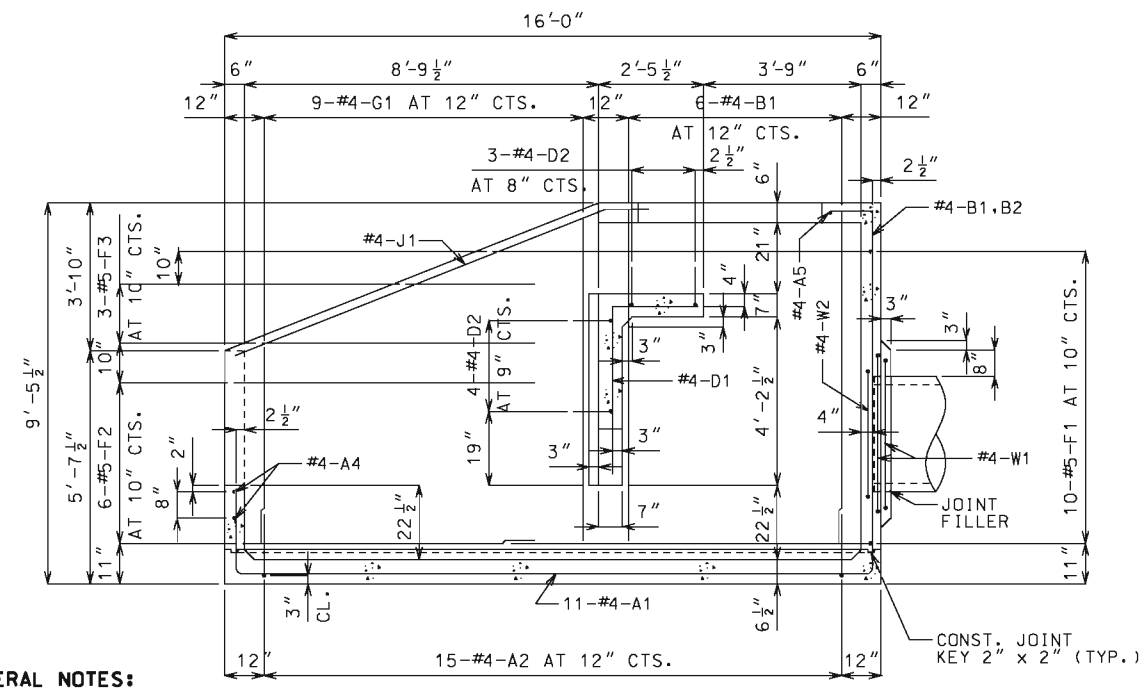
DATE EFFECTIVE: 07/01/2001  
DATE PREPARED: 9/3/2009

**604.11E**

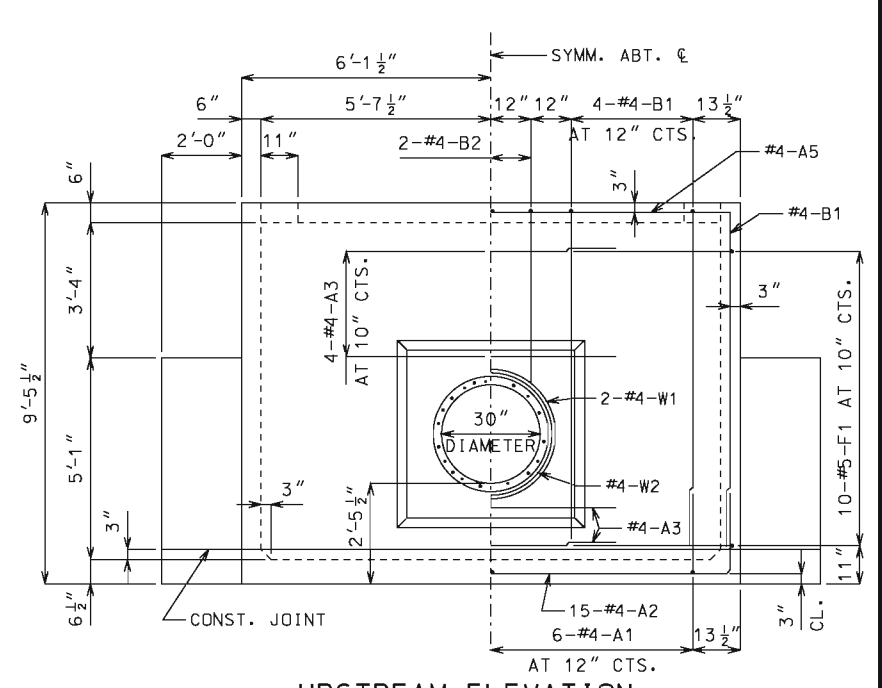
SHEET NO.  
1 OF 1



DOWNSTREAM ELEVATION

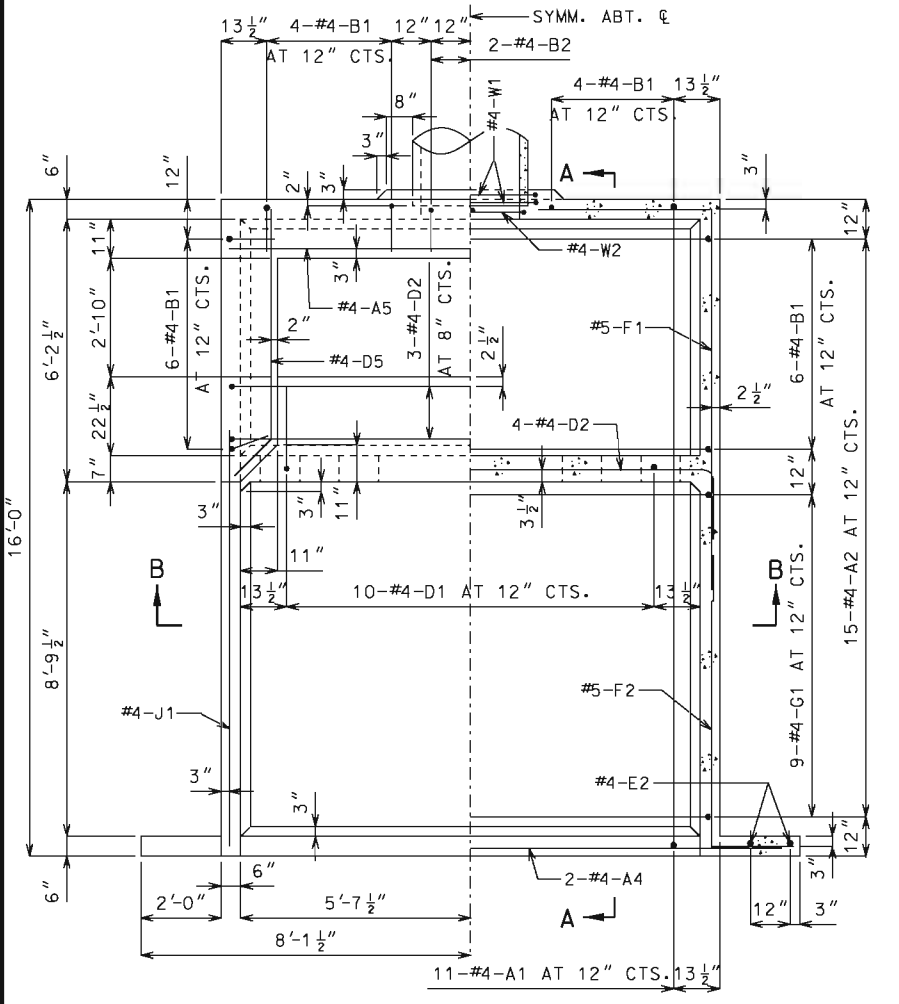


SECTION A - A



UPSTREAM ELEVATION

NOTE: BEND OR CUT A1 BARS IN FIELD TO CLEAR PIPE.



HALF PLAN HALF HORIZONTAL SECTION

GENERAL NOTES:

DESIGN UNIT STRESSES

CLASS B CONCRETE  $f'_c = 3,000$  psi  
REINFORCING STEEL (GRADE 60)  $f_y = 60,000$  psi

REINFORCING STEEL

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ " UNLESS SHOWN OTHERWISE.

DIMENSIONS

DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS.

| ESTIMATED QUANTITIES |         |       |
|----------------------|---------|-------|
| ITEM                 |         | TOTAL |
| CLASS B CONCRETE     | CU. YD. | 13.2  |
| REINFORCING STEEL    | LBS.    | 1,170 |

| COMPLETE BILL OF REINFORCING STEEL |       |          |           |            |          |            |                         |         |         |         |         |         |         | BENDING DIAGRAMS |               |                                                                                       |                                                                                       |                                                                                       |
|------------------------------------|-------|----------|-----------|------------|----------|------------|-------------------------|---------|---------|---------|---------|---------|---------|------------------|---------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| NO.                                | REQ'D | MARK NO. | SHAPE NO. | VARIES (V) | NO. EACH | DIMENSIONS |                         |         |         |         |         |         |         | NOMINAL LENGTH   | ACTUAL LENGTH | WEIGHT                                                                                |                                                                                       |                                                                                       |
|                                    |       |          |           |            |          | B          | C                       | D       | E       | F       | H       | K       |         |                  |               |                                                                                       |                                                                                       |                                                                                       |
|                                    |       | SIZE     | MARK      | FT. IN.    | FT. IN.  | FT. IN.    | FT. IN.                 | FT. IN. | FT. IN. | FT. IN. | FT. IN. | FT. IN. | FT. IN. | FT. IN.          | LBS.          |                                                                                       |                                                                                       |                                                                                       |
| 11                                 | 4     | A1       | 11        |            |          | 2-0½       | 15-6                    | 0-20½   |         |         |         |         | 19-3    | 19-1             | 140           |  |  |  |
| 15                                 | 4     | A2       | 11        |            |          | 0-20½      | 11-10                   | 0-20½   |         |         |         |         | 15-3    | 15-1             | 151           |                                                                                       |                                                                                       |                                                                                       |
| 6                                  | 4     | A3       | 20        |            |          | 5-4        |                         |         |         |         |         |         | 5-4     | 5-4              | 21            |                                                                                       |                                                                                       |                                                                                       |
| 2                                  | 4     | A4       | 20        |            |          | 13-3       |                         |         |         |         |         |         | 13-3    | 13-3             | 18            |                                                                                       |                                                                                       |                                                                                       |
| 1                                  | 4     | A5       | 20        |            |          | 11-9       |                         |         |         |         |         |         | 11-9    | 11-9             | 8             |                                                                                       |                                                                                       |                                                                                       |
| 20                                 | 4     | B1       | 19        |            |          | 8-5½       | 0-13                    |         |         |         |         |         | 9-7     | 9-5              | 126           |  |  |  |
| 3                                  | 4     | B2       | 19        |            |          | 4-0        | 0-13                    |         |         |         |         |         | 5-1     | 5-0              | 10            |                                                                                       |                                                                                       |                                                                                       |
| 10                                 | 4     | D1       | 19        |            |          | 4-4        | 2-0½                    |         |         |         |         |         | 6-5     | 6-3              | 42            |                                                                                       |                                                                                       |                                                                                       |
| 7                                  | 4     | D2       | 11        |            |          | 0-12       | 11-10                   | 0-12    |         |         |         |         | 13-10   | 13-8             | 64            |                                                                                       |                                                                                       |                                                                                       |
| 1                                  | 4     | D3       | 15        |            |          | 2-11       | 4-7                     | 2-11    | 2-6     | 0-18    | 2-6     | 0-18    | 10-5    | 10-4             | 7             |                                                                                       |                                                                                       |                                                                                       |
| 2                                  | 4     | D4       | 14        |            |          | 0-12       | 0-7                     | 3-0     |         |         | 2-6     | 0-20    | 4-7     | 4-5              | 6             |                                                                                       |                                                                                       |                                                                                       |
| 2                                  | 4     | D5       | 23        |            |          | 0-18⅝      | 5-7                     |         |         |         | 0-13    | 0-13    | 7-1     | 7-1              | 9             |                                                                                       |                                                                                       |                                                                                       |
| 2                                  | 4     | E1       | 20        |            |          | 3-0        |                         |         |         |         |         |         | 3-0     | 3-0              | 4             |                                                                                       |                                                                                       |                                                                                       |
| 4                                  | 4     | E2       | 20        |            |          | 5-3        |                         |         |         |         |         |         | 5-3     | 5-3              | 14            |                                                                                       |                                                                                       |                                                                                       |
| 20                                 | 5     | F1       | 19        |            |          | 8-8⅜       | 4-2½                    |         |         |         |         |         | 12-11   | 12-9             | 266           |                                                                                       |                                                                                       |                                                                                       |
| 12                                 | 5     | F2       | 19        |            |          | 2-1        | 8-1                     |         |         |         |         |         | 10-2    | 10-1             | 126           |                                                                                       |                                                                                       |                                                                                       |
| 6                                  | 5     | F3       | 20        | V          | 2        | 3-0⅞       |                         |         |         |         |         |         | 3-1     | 3-1              |               |                                                                                       |                                                                                       |                                                                                       |
|                                    |       |          |           |            |          | 7-0⅞       | (INCREMENT = 24 INCHES) |         |         |         |         |         | 7-1     | 7-1              | 32            |                                                                                       |                                                                                       |                                                                                       |
| 18                                 | 4     | G1       | 20        | V          | 2        | 5-1⅜       |                         |         |         |         |         |         | 5-1     | 5-1              |               |                                                                                       |                                                                                       |                                                                                       |
|                                    |       |          |           |            |          | 8-5⅜       | (INCREMENT = 5 INCHES)  |         |         |         |         |         | 8-5     | 8-5              | 81            |                                                                                       |                                                                                       |                                                                                       |
| 2                                  | 4     | J1       | 20        |            |          | 10-11      |                         |         |         |         |         |         | 10-11   | 10-11            | 15            |                                                                                       |                                                                                       |                                                                                       |
| 2                                  | 4     | W1       | 16        |            |          | 3-6        |                         |         |         |         |         |         | 11-10   | 11-10            | 16            |                                                                                       |                                                                                       |                                                                                       |
| 1                                  | 4     | W2       | 16        |            |          | 2-11       |                         |         |         |         |         |         | 10-0    | 10-0             | 7             |                                                                                       |                                                                                       |                                                                                       |

SHAPE 11

SHAPE 14

SHAPE 15

SHAPE 16

SHAPE 19

SHAPE 20

SHAPE 23

90° STANDARD HOOKS

ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEG. TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEG. STANDARD HOOKS.

HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

LENGTH = TOTAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.

V - BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.

NO.EA. = NUMBER OF BARS OF EACH LENGTH.

ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEG. TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEG. STANDARD HOOKS.

HOOKE AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

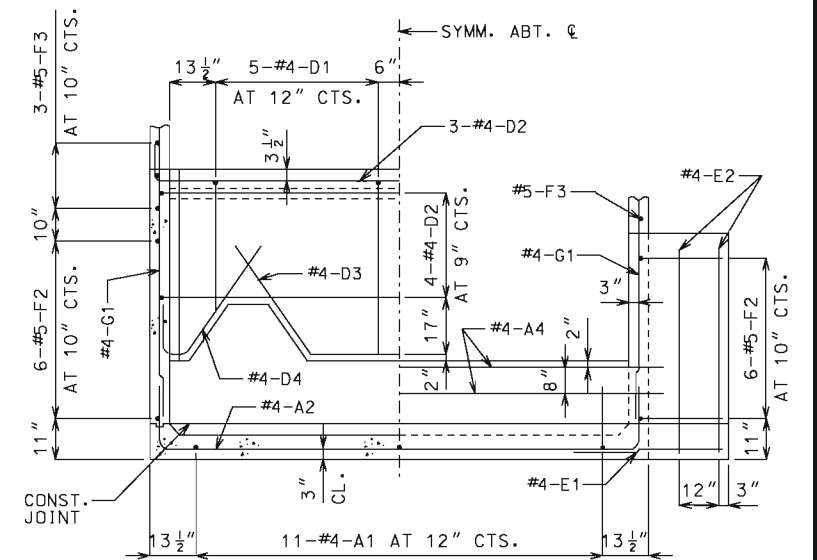
NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

LENGTH = TOTAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.

V - BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.

NO.EA. = NUMBER OF BARS OF EACH LENGTH.



HALF ELEVATION OF LOWER BAFFLE AND WING

NOTE: BEND OR CUT D1 BARS IN FIELD TO CLEAR NOTCH IN BAFFLE WALL.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

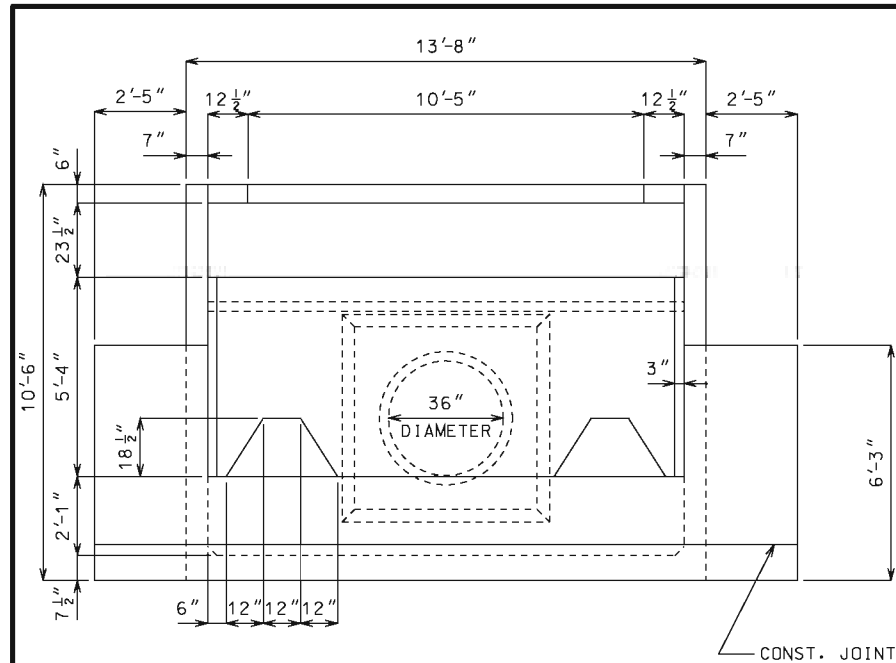
**PIPE CULVERT HEADWALL**  
ENERGY DISSIPATOR (IMPACT TYPE)  
FOR 30" CONCRETE PIPE

DATE EFFECTIVE: 07/01/2001  
DATE PREPARED: 9/3/2009

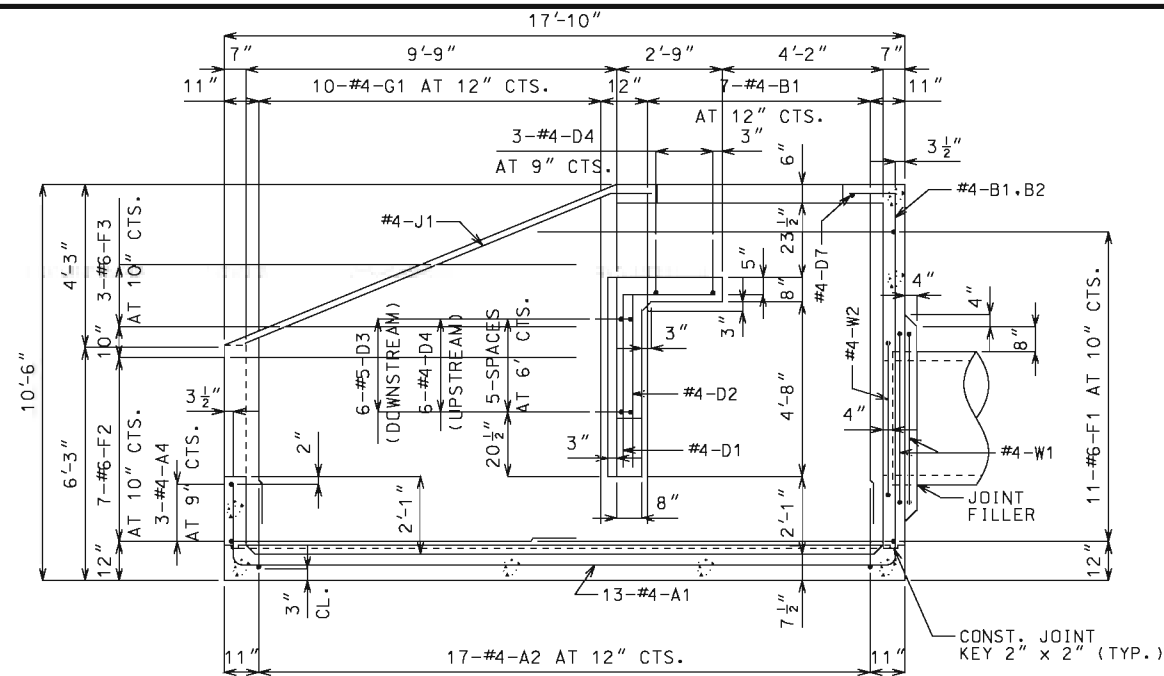
**604.12E**

SHEET NO.  
1 OF 1

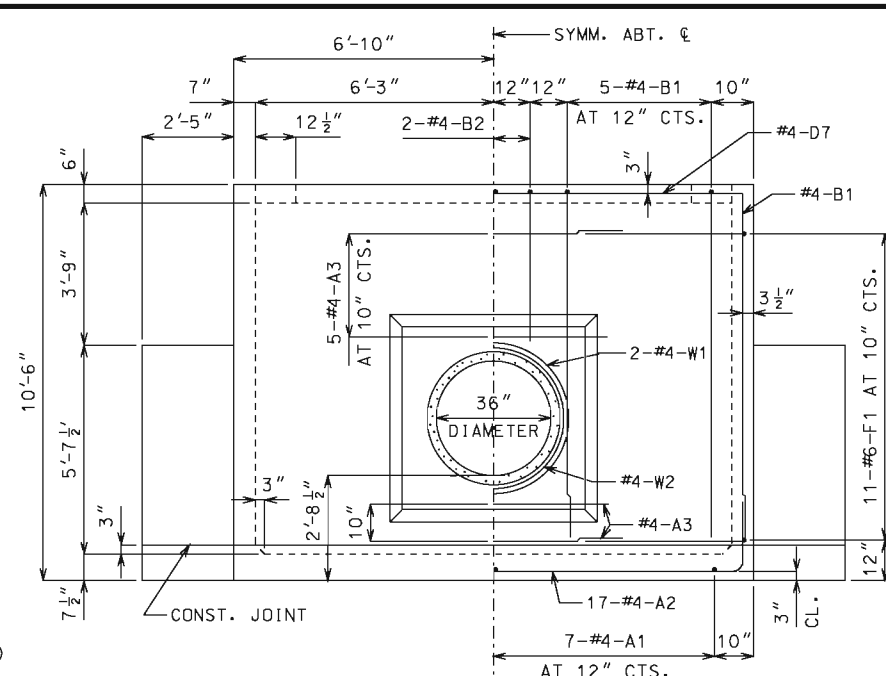
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



DOWNSTREAM ELEVATION

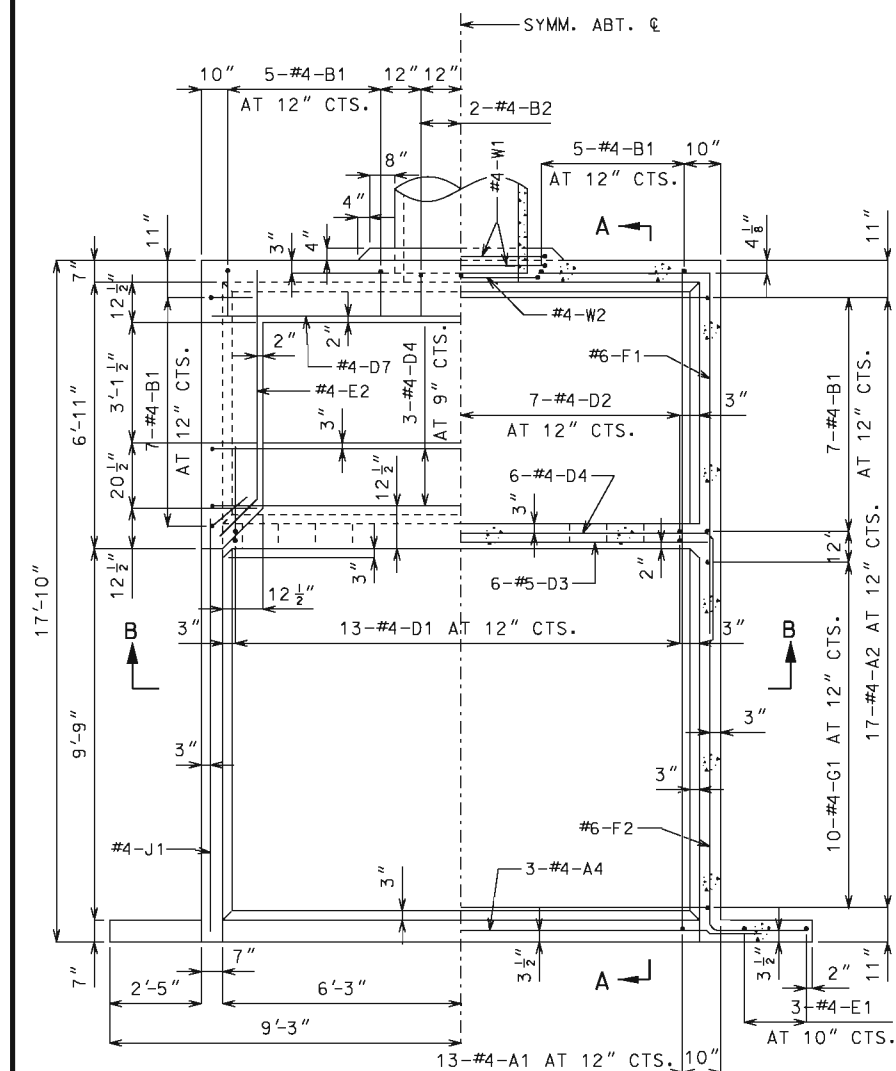


SECTION A - A



UPSTREAM ELEVATION

NOTE: BEND OR CUT A1 BARS IN FIELD TO CLEAR PIPE.



HALF PLAN HALF HORIZONTAL SECTION

# GENERAL NOTES:

## DESIGN UNIT STRESSES

CLASS B CONCRETE  $f'c = 3,000$  psi  
REINFORCING STEEL (GRADE 60)  $f_y = 60,000$  psi

## REINFORCING STEEL

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ " UNLESS SHOWN OTHERWISE.

## DIMENSIONS

DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS.

| ESTIMATED QUANTITIES |         |       |
|----------------------|---------|-------|
| ITEM                 |         | TOTAL |
| CLASS B CONCRETE     | CU. YD. | 19.0  |
| REINFORCING STEEL    | LBS.    | 1,870 |

| COMPLETE BILL OF REINFORCING STEEL |       |          |           |            |          |            |                         |         |         |         |         |         |         |                | BENDING DIAGRAMS |        |  |
|------------------------------------|-------|----------|-----------|------------|----------|------------|-------------------------|---------|---------|---------|---------|---------|---------|----------------|------------------|--------|--|
| NO.                                | REQ'D | MARK NO. | SHAPE NO. | VARIES (V) | NO. EACH | DIMENSIONS |                         |         |         |         |         |         |         | NOMINAL LENGTH | ACTUAL LENGTH    | WEIGHT |  |
|                                    |       |          |           |            |          | B          | C                       | D       | E       | F       | H       | K       |         |                |                  |        |  |
| 13                                 | 4     | A1       | 11        |            |          | FT. IN.    | FT. IN.                 | FT. IN. | FT. IN. | FT. IN. | FT. IN. | FT. IN. | FT. IN. | FT. IN.        | LBS.             |        |  |
| 13                                 | 4     | A1       | 11        |            |          |            | 2-2½                    | 17-5½   | 2-4     |         |         |         | 22-0    | 21-10          | 190              |        |  |
| 17                                 | 4     | A2       | 11        |            |          |            | 2-4                     | 13-1    | 2-4     |         |         |         | 17-9    | 17-7           | 200              |        |  |
| 7                                  | 4     | A3       | 20        |            |          | 5-11       |                         |         |         |         |         |         | 5-11    | 5-11           | 28               |        |  |
| 3                                  | 4     | A4       | 20        |            |          | 15-2       |                         |         |         |         |         |         | 15-2    | 15-2           | 30               |        |  |
| 24                                 | 4     | B1       | 19        |            |          | 8-7½       | 0-15                    |         |         |         |         |         | 9-11    | 9-9            | 156              |        |  |
| 3                                  | 4     | B2       | 19        |            |          | 4-2½       | 0-15                    |         |         |         |         |         | 5-6     | 5-4            | 11               |        |  |
| 13                                 | 4     | D1       | 19        |            |          | 4-11       | 2-5½                    |         |         |         |         |         | 7-5     | 7-3            | 63               |        |  |
| 13                                 | 4     | D2       | 20        |            |          | 4-11       |                         |         |         |         |         |         | 4-11    | 4-11           | 43               |        |  |
| 6                                  | 5     | D3       | 20        |            |          | 13-5       |                         |         |         |         |         |         | 13-5    | 13-5           | 84               |        |  |
| 9                                  | 4     | D4       | 11        |            |          |            | 0-12                    | 13-2    | 0-12    |         |         |         | 15-2    | 15-0           | 90               |        |  |
| 4                                  | 4     | D5       | 14        |            |          | 0-12       | 0-8¾                    | 3-0     |         |         | 2-6     | 0-20    | 4-9     | 4-7            | 12               |        |  |
| 2                                  | 4     | D6       | 15        |            |          | 3-0        | 5-4½                    | 3-0     | 2-6     | 0-20    | 2-6     | 0-20    | 11-5    | 11-4           | 15               |        |  |
| 1                                  | 4     | D7       | 20        |            |          | 13-5       |                         |         |         |         |         |         | 13-5    | 13-5           | 9                |        |  |
| 6                                  | 4     | E1       | 20        |            |          | 6-0        |                         |         |         |         |         |         | 6-0     | 6-0            | 24               |        |  |
| 2                                  | 4     | E2       | 15        |            |          | 0-22⅝      | 6-0                     |         |         |         | 0-16    | 0-16    | 7-11    | 7-10           | 10               |        |  |
| 2                                  | 4     | E3       | 20        |            |          | 3-7        |                         |         |         |         |         |         | 3-7     | 3-7            | 5                |        |  |
| 22                                 | 6     | F1       | 19        |            |          | 9-10½      | 4-7½                    |         |         |         |         |         | 14-6    | 14-4           | 474              |        |  |
| 14                                 | 6     | F2       | 19        |            |          | 9-2½       | 2-6½                    |         |         |         |         |         | 11-9    | 11-7           | 244              |        |  |
| 6                                  | 6     | F3       | 20        | V          | 2        | 3-6        |                         |         |         |         |         |         | 3-6     | 3-6            |                  |        |  |
|                                    |       |          |           |            |          | 7-6        | (INCREMENT = 24 INCHES) |         |         |         |         |         | 7-6     | 7-6            | 50               |        |  |
| 20                                 | 4     | G1       | 20        | V          | 2        | 4-9        |                         |         |         |         |         |         | 4-9     | 4-9            |                  |        |  |
|                                    |       |          |           |            |          | 8-5½       | (INCREMENT = 5 INCHES)  |         |         |         |         |         | 8-6     | 8-6            | 89               |        |  |
| 2                                  | 4     | J1       | 20        |            |          | 12-0       |                         |         |         |         |         |         | 12-0    | 12-0           | 16               |        |  |
| 2                                  | 4     | W1       | 16        |            |          | 4-0½       |                         |         |         |         |         |         | 13-7    | 13-7           | 18               |        |  |
| 1                                  | 4     | W2       | 16        |            |          | 3-4½       |                         |         |         |         |         |         | 11-6    | 11-6           | 8                |        |  |

SHAPE 11      SHAPE 14      SHAPE 15

SHAPE 16      SHAPE 19      SHAPE 20

Detailing Dimension  
90° STANDARD HOOKS

ALL STANDARD HOOKS AND BENDS OTHER THAN 90 DEG. TO BE BENT WITH SAME PROCEDURES AS FOR 90 DEG. STANDARD HOOKS.

HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

NOMINAL LENGTHS ARE BASED ON OUT-TO-OUT DIMENSIONS SHOWN IN BENDING DIAGRAM. DIMENSIONS ARE LISTED FOR FABRICATOR'S USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTH.

LENGTH = TOTAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST 1/8 INCH.

V - BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON LINE AND THE FOLLOWING LINE.

NO. EA. = NUMBER OF BARS OF EACH LENGTH

ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEG. TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEG. STANDARD HOOKS.

HOOCS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.

NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE.

PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.

LENGTH = TOTAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.

V - BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.

NO.EA. = NUMBER OF BARS OF EACH LENGTH.

HALF SECTION B-B HALF ELEVATION OF LOWER BAFFLE AND WING

NOTE: BEND OR CUT D1 AND D2 BARS IN FIELD TO CLEAR NOTCH IN BAFFLE WALL.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

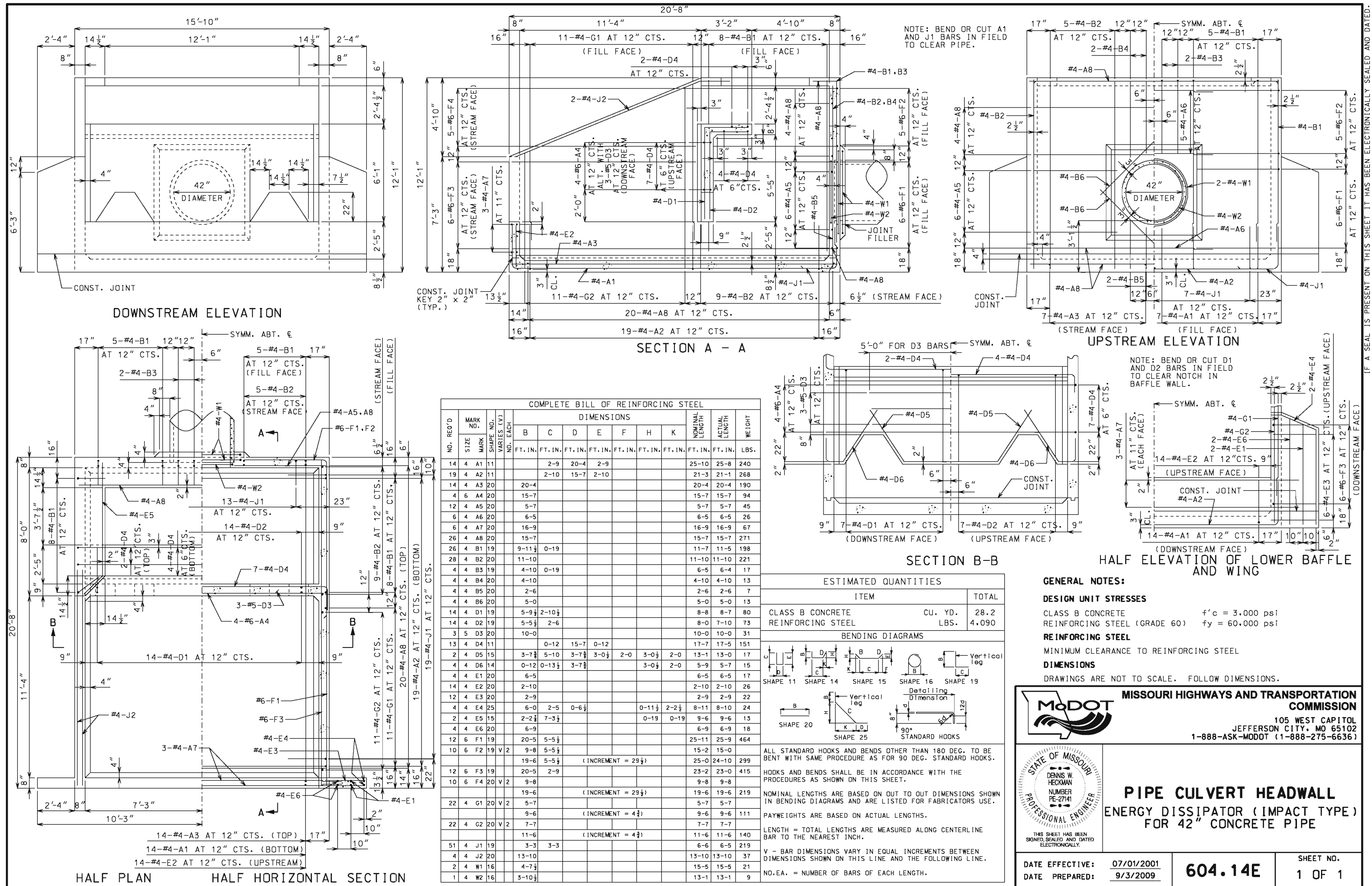
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PIPE CULVERT HEADWALL**  
ENERGY DISSIPATOR (IMPACT TYPE)  
FOR 36" CONCRETE PIPE

DATE EFFECTIVE: 07/01/2001  
DATE PREPARED: 9/3/2009

**604.13E**

SHEET NO.  
1 OF 1









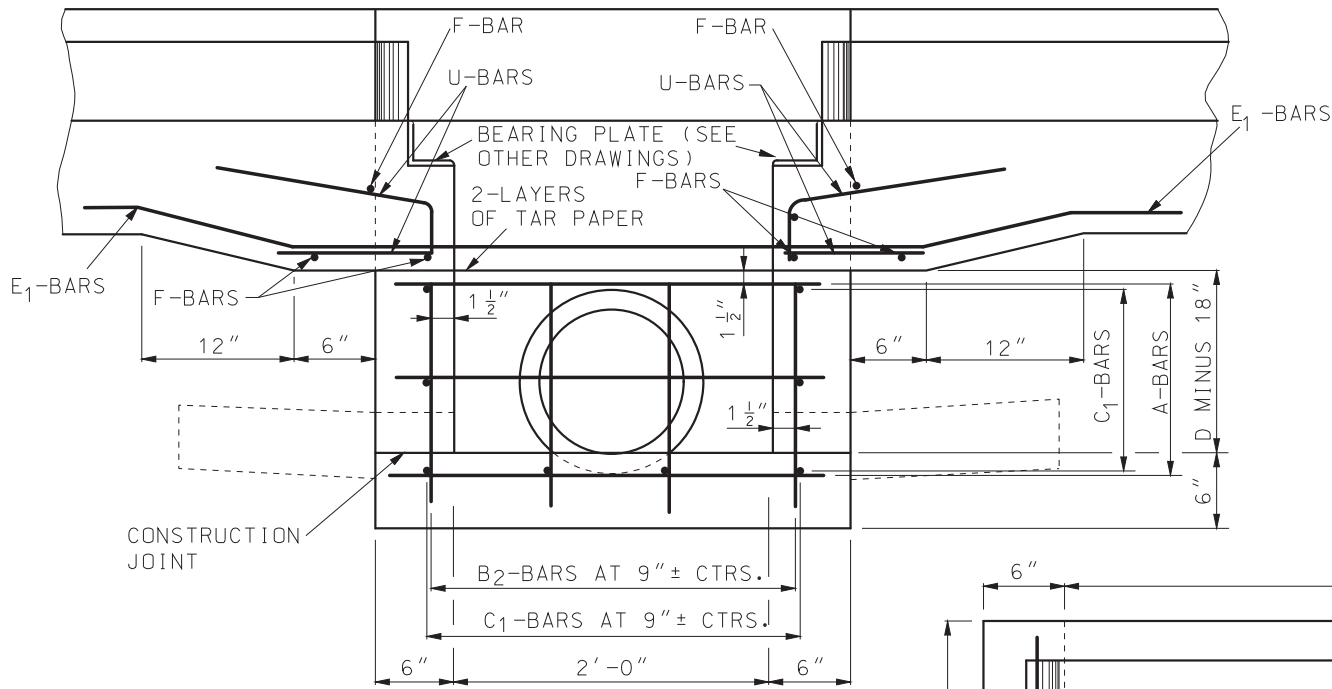
| BAR BILL - EXTENSION |      |       |        |       |        |       |        |
|----------------------|------|-------|--------|-------|--------|-------|--------|
| LENGTH OF EXT. L     |      | 2'-6" |        | 5'-0" |        | 7'-6" |        |
| MARK                 | SIZE | NO.   | LENGTH | NO.   | LENGTH | NO.   | LENGTH |
| G                    | #5   | 4     | 3'-3"  | 7     | 3'-3"  | 10    | 3'-3"  |
| H <sub>1</sub>       | #4   | 4     | 2'-6"  | 4     | 2'-6"  | 4     | 2'-6"  |
| H <sub>2</sub>       | #4   | 2     | 2'-9"  | 3     | 2'-9"  | 3     | 2'-9"  |
| H <sub>3</sub>       | #4   |       |        | 2     | 3'-0"  | 3     | 3'-0"  |
| H <sub>4</sub>       | #4   |       |        |       |        | 2     | 3'-3"  |
| H <sub>5</sub>       | #4   | 1     | 1'-0"  | 1     | 1'-0"  | 1     | 1'-0"  |
| H <sub>6</sub>       | #4   | 2     | 1'-3"  | 3     | 1'-3"  | 3     | 1'-3"  |
| H <sub>7</sub>       | #4   |       |        | 2     | 1'-6"  | 3     | 1'-6"  |
| H <sub>8</sub>       | #4   |       |        |       |        | 2     | 1'-9"  |
| K                    | #4   | 7     | 1'-9"  | 10    | 1'-9"  | 13    | 1'-9"  |
| L                    | #4   | 11    | 2'-9"  | 11    | 5'-3"  | 11    | 7'-9"  |
| DOWEL BAR            | #4   | 8     | 1'-0"  | 9     | 1'-0"  | 10    | 1'-0"  |

| CU. YDS. & LBS. ADDITIONS TO BE MADE FOR EACH EXTENSION |          |       |
|---------------------------------------------------------|----------|-------|
| LENGTH                                                  | CU. YDS. | LBS.  |
| 2'-6"                                                   | 0.39     | 60.0  |
| 5'-0"                                                   | 0.70     | 101.4 |
| 7'-6"                                                   | 1.04     | 143.8 |

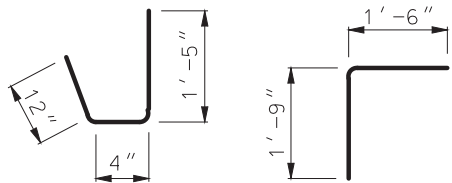
| CU. YDS. DEDUCTION TO BE MADE FOR PIPE OPENING |      |      |      |
|------------------------------------------------|------|------|------|
| 12"                                            | 15"  | 18"  | 24"  |
| 0.03                                           | 0.04 | 0.05 | 0.09 |

| CONCRETE AND STEEL DEDUCTIONS TO BE MADE FOR EACH EXTENSION OPENING |           |           |
|---------------------------------------------------------------------|-----------|-----------|
| 9" X 12"                                                            | 12" X 12" | 15" X 12" |
| 0.01 C.Y.                                                           | 0.02 C.Y. | 0.02 C.Y. |
| 2.5 LBS.                                                            | 3.7 LBS.  | 4.0 LBS.  |

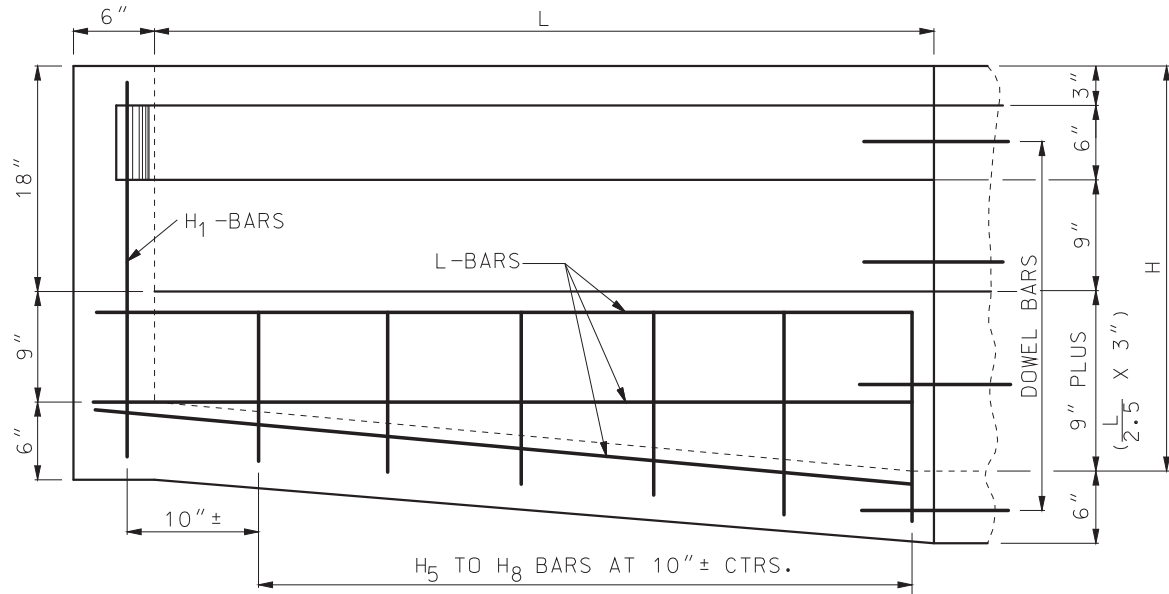
| BAR BILL - INTAKE BOX                               |                      |               |                                        |        |                         |        |                         |        |                                       |             |                                    |        |                              |        |                              |        |                            |        |              |        |  |
|-----------------------------------------------------|----------------------|---------------|----------------------------------------|--------|-------------------------|--------|-------------------------|--------|---------------------------------------|-------------|------------------------------------|--------|------------------------------|--------|------------------------------|--------|----------------------------|--------|--------------|--------|--|
| D                                                   | CONC.<br>CU.<br>YDS. | STEEL<br>LBS. | A-BARS                                 |        | B <sub>1</sub> -BARS    |        | B <sub>2</sub> -BARS    |        | C <sub>1</sub> -BARS                  |             | C <sub>2</sub> -BARS               |        | E <sub>1</sub> -BARS         |        | E <sub>2</sub> -BARS         |        | F-BARS                     |        | U-BARS       |        |  |
|                                                     |                      |               | TRANSVERSE<br>IN BOTTOM<br>WALLS & TOP |        | VERTICAL<br>IN<br>WALLS |        | VERTICAL<br>IN<br>WALLS |        | LONGITUDINAL<br>IN BOTTOM<br>AND SIDE |             | LONGITUDINAL<br>IN SIDE<br>AND TOP |        | LONGITUDINAL<br>IN<br>GUTTER |        | LONGITUDINAL<br>IN<br>GUTTER |        | TRANSVERSE<br>IN<br>GUTTER |        | IN<br>GUTTER |        |  |
|                                                     |                      |               | NO.                                    | LENGTH | NO.                     | LENGTH | NO.                     | LENGTH | NO.                                   | LENGTH      | NO.                                | LENGTH | NO.                          | LENGTH | NO.                          | LENGTH | NO.                        | LENGTH | NO.          | LENGTH |  |
| 2'-6"                                               | 0.82                 | 131           | 15                                     | 2'-9"  | 8                       | 2'-9"  | 10                      | 1'-3"  | 8                                     | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 2'-9"                                               | 0.88                 | 134           | 15                                     | 2'-9"  | 8                       | 3'-0"  | 10                      | 1'-6"  | 8                                     | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 3'-0"                                               | 0.94                 | 137           | 15                                     | 2'-9"  | 8                       | 3'-3"  | 10                      | 1'-9"  | 8                                     | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 3'-3"                                               | 1.00                 | 140           | 15                                     | 2'-9"  | 8                       | 3'-6"  | 10                      | 2'-0"  | 8                                     | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 3'-6"                                               | 1.06                 | 152           | 17                                     | 2'-9"  | 8                       | 3'-9"  | 10                      | 2'-3"  | 10                                    | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 3'-9"                                               | 1.12                 | 155           | 17                                     | 2'-9"  | 8                       | 4'-0"  | 10                      | 2'-6"  | 10                                    | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 4'-0"                                               | 1.18                 | 158           | 17                                     | 2'-9"  | 8                       | 4'-3"  | 10                      | 2'-9"  | 10                                    | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 4'-3"                                               | 1.24                 | 170           | 19                                     | 2'-9"  | 8                       | 4'-6"  | 10                      | 3'-0"  | 12                                    | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 4'-6"                                               | 1.30                 | 173           | 19                                     | 2'-9"  | 8                       | 4'-9"  | 10                      | 3'-3"  | 12                                    | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 4'-9"                                               | 1.36                 | 176           | 19                                     | 2'-9"  | 8                       | 5'-0"  | 10                      | 3'-6"  | 12                                    | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| 5'-0"                                               | 1.42                 | 189           | 21                                     | 2'-9"  | 8                       | 5'-3"  | 10                      | 3'-9"  | 14                                    | 4'-3"       | 6                                  | 1'-3"  | 5                            | 7'-0"  | 1                            | 4'-9"  | 6                          | 2'-9"  | 8            | 2'-9"  |  |
| CONCRETE QUANTITIES INCLUDE 0.15 CU.YDS. FOR INVERT |                      |               |                                        |        |                         |        |                         |        |                                       | ALL BARS #4 |                                    |        |                              |        |                              |        |                            |        |              |        |  |



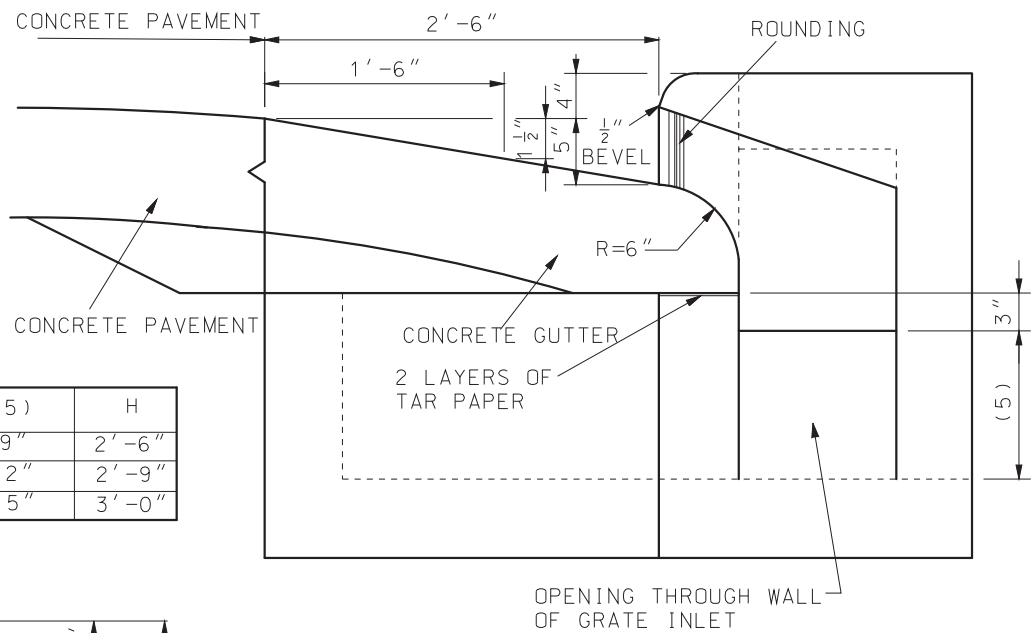
SECTION B-B



U-BARS  
BENDING DIAGRAMS  
G-BARS



LONGITUDINAL SECTION  
(EXTENSION)



SECTION SHOWING DETAILS OF OPENING AND  
DEPRESSION IN PAVEMENT OR GUTTER

| L     | (5) | H     |
|-------|-----|-------|
| 2'-6" | 9"  | 2'-6" |
| 5'-0" | 12" | 2'-9" |
| 7'-6" | 15" | 3'-0" |



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



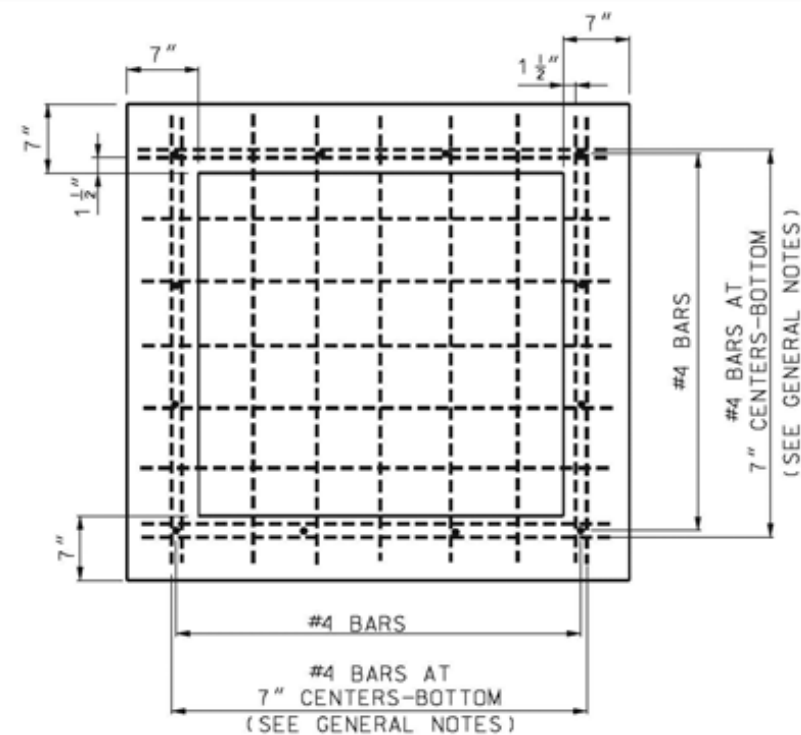
**DROP INLET  
TYPE X**

DATE EFFECTIVE: 04/01/1983  
DATE PREPARED: 2/9/2018

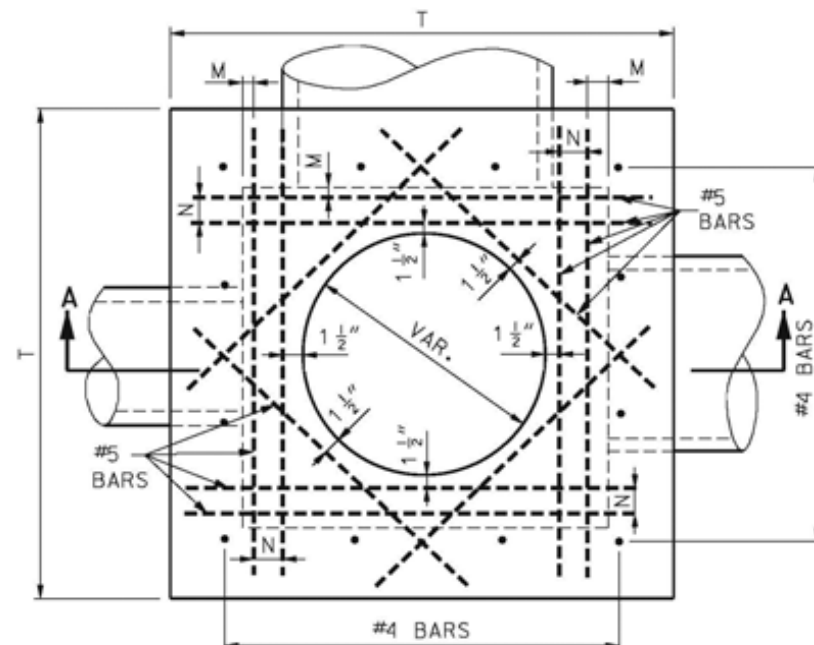
604.29C

SHEET NO.  
2 OF 2

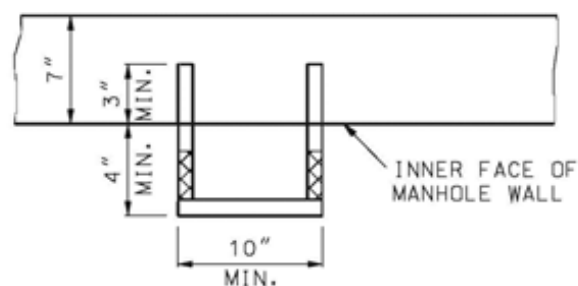
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



BASE PLAN



PLAN VIEW

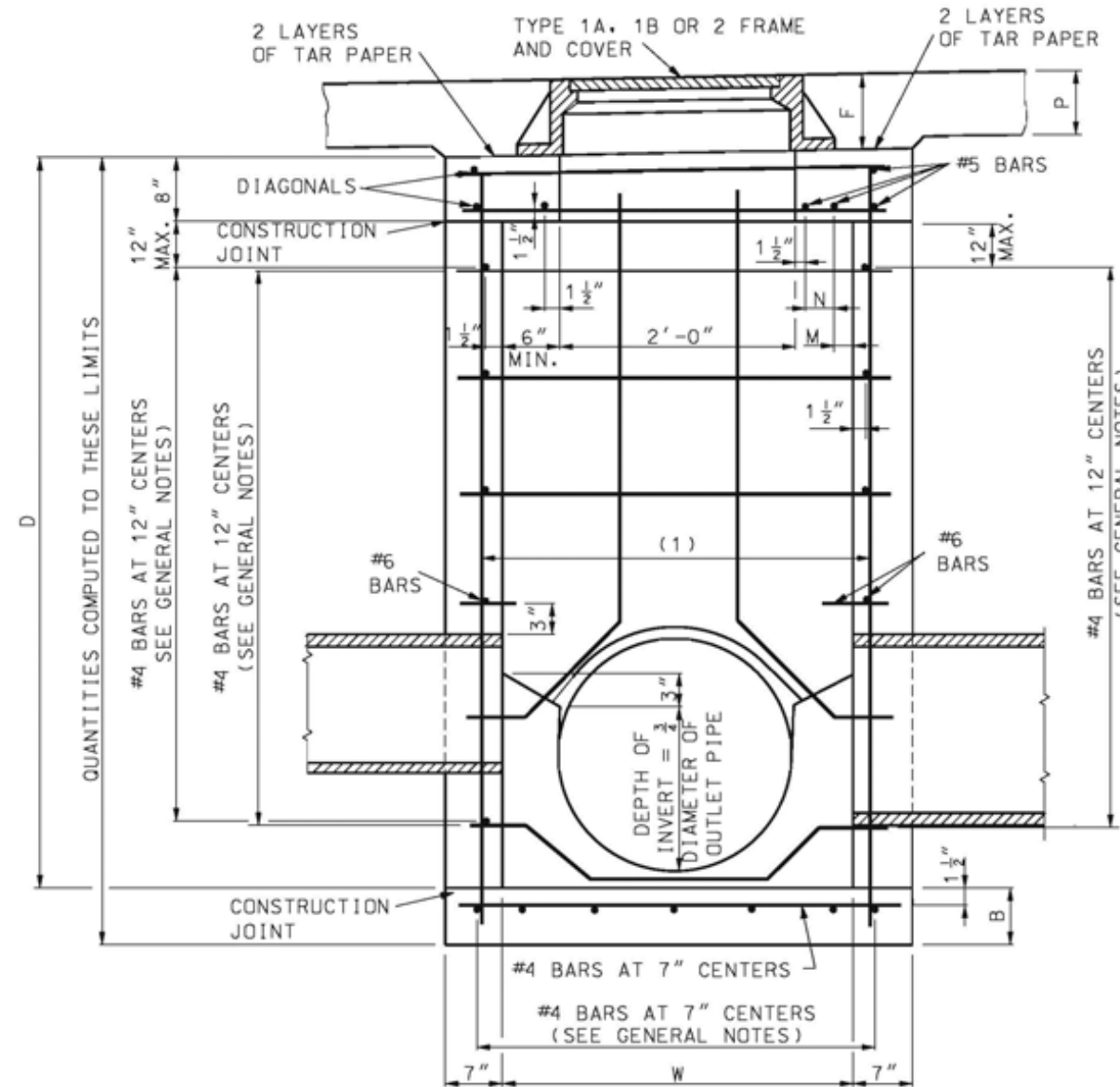


STEP INSTALLATION

STEPS SHALL BE PLACED AT VERTICAL INTERVALS OF 16" MAXIMUM IN ALL MANHOLES HAVING A DEPTH OF MORE THAN 4'-0". STEPS SHALL BEGIN AT AN ELEVATION 6" ABOVE THE TOP OF THE OUTLET PIPE.

STEPS SHALL BE SET LEVEL AND IN VERTICAL ALIGNMENT.

NO DIRECT PAYMENT WILL BE MADE FOR MANHOLE STEPS.



SECTION A-A

| VARIABLE DIMENSIONS |       |       |    |          |         |
|---------------------|-------|-------|----|----------|---------|
| SIZE OF PIPE        | W     | T     | B  | M        | N       |
| ≤ 24"               | 3'-0" | 4'-2" | 7" | VARIABLE | 2 1/2"  |
| 30"                 | 3'-6" | 4'-8" | 7" |          | 5 1/2"  |
| 36"                 | 4'-0" | 5'-2" | 7" |          | 8"      |
| 42"                 | 4'-6" | 5'-8" | 8" |          | 5 1/2"* |
| 48"                 | 5'-0" | 6'-2" | 8" |          | 7"*     |
| * 4-#5 BARS ADDED   |       |       |    |          |         |

NOTES:  
MINIMUM "D" SHALL BE THE OUTSIDE DIAMETER OF LARGEST PIPE ENTERING MANHOLE PLUS 16" CARRIED TO THE NEAREST 3".

HORIZONTAL AND VERTICAL BARS HORIZONTAL AND VERTICAL BARS AROUND PIPES.

MANHOLE FRAME AND COVER IN PAVED AREAS USE TYPE 1. IN UNPAVED AREAS USED TYPE 1A OR 1B. NO CHANGE IN QUANTITIES REQUIRED FOR FRAME AND COVER DETAILS. SEE OTHER DRAWINGS.

- (1) 4-#4 FOR 3'-0" OPENING  
5-#4 FOR 3'-6" & 4'-0"  
6-#4 FOR 4'-6" & 5'-0"

GENERAL NOTES:

THE MAXIMUM DEPTH OF MANHOLE USING #4 HORIZONTAL BARS AT 12" CENTERS IS 20'.

OVER 20' DEPTH, HORIZONTAL BARS SHALL BE INCREASED TO A #5 BAR AT 10" CENTERS TO A MAXIMUM DEPTH OF 30'.

OVER 30' DEPTH WILL REQUIRE A SPECIAL DESIGN.

BOTTOM STEEL AT MORE THAN 20' DEPTH TO A MAXIMUM DEPTH OF 30' IS INCREASED TO #6 BARS AT 7" CENTERS.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**STATE OF MISSOURI**  
KATHRYN PHILLIPS HARVEY  
NUMBER PE-23751  
PROFESSIONAL ENGINEER  
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE MANHOLES

DATE EFFECTIVE: 02-01-2009  
DATE PREPARED: 8/26/2009

604.30G

SHEET NO.  
1 OF 2

| FOR PIPE OPENINGS                          |            |      |      |       |       |       |       |       |
|--------------------------------------------|------------|------|------|-------|-------|-------|-------|-------|
|                                            | PIPE SIZES |      |      |       |       |       |       |       |
|                                            | 12"        | 15"  | 18"  | 24"   | 30"   | 36"   | 42"   | 48"   |
| CUBIC YARDS<br>CONCRETE<br>TO DEDUCT       | 0.03       | 0.04 | 0.06 | 0.11  | 0.16  | 0.23  | 0.31  | 0.40  |
| ADDITIONAL STEEL REQUIRED FOR PIPE OPENING |            |      |      |       |       |       |       |       |
| WIDTH OF WALL REQUIRED FOR PIPE            |            |      |      | 3'-0" | 3'-6" | 4'-0" | 4'-6" | 5'-0" |
| LENGTH OF #6 BAR REQUIRED                  |            |      |      | 4'-0" | 4'-6" | 5'-0" | 5'-6" | 6'-0" |
| WEIGHT OF BAR LBS.                         |            |      |      | 6.0   | 6.8   | 7.5   | 8.3   | 9.0   |

NOTE:  
CONCRETE QUANTITIES IN TABLE INCLUDE INVERT. THE QUANTITY OF STEEL FOR 3" OF "D" IS NOT ¼ OF THAT FOR 1 FOOT OF "D". NEITHER IS THE QUANTITY FOR 6" OF "D" EQUAL TO ½ THAT FOR 1 FOOT OF "D". SO USE QUANTITY IN 1 FOOT COLUMN FOR FULL FEET AND IN 3" COLUMN FOR FRACTIONAL FEET.

TO AND INCLUDING 20-FOOT DEPTH

NOTE:  
TO COMPUTE THE QUANTITIES FOR DEPTHS ("D") NOT SHOWN, REFER TO TABLE FOR THE SIZE OF MANHOLE REQUIRED. SUBTRACT THE "D" VALUE FROM THE TABLE AND THE "D" VALUE FROM THE PLANS. MULTIPLY THE VALUES SHOWN IN THE 1-FOOT COLUMN FROM THE TABLE WITH THE FULL ONE FOOT INCREMENTS FROM THE DIFFERENCE BETWEEN THE "D" FROM THE PLANS AND THE "D" FROM THE TABLE. MULTIPLY THE VALUES SHOWN IN THE 3" COLUMN FROM THE TABLE WITH THE REMAINING FRACTIONAL FOOT VALUES PER 3" INCREMENTS. FOLLOW THIS SAME PROCESS FOR THE STEEL CALCULATIONS. SEE THE EXPAMPLE BELOW:

FOR EXAMPLE: QUANTITIES FOR 3'-0" X 4'-0" MANHOLE WITH 6'-9" "D" HAVING ONE 18", ONE 24" AND ONE 36" PIPE OPENINGS ARE DETERMINED AS FOLLOWS:  
"D" REQUIRED = 6'-9"  
"D" GIVEN IN TABLE = 4'-3"  
"D" ADDITIONAL = 2'-6"

|                                                                                                    |       |          |       |
|----------------------------------------------------------------------------------------------------|-------|----------|-------|
|                                                                                                    | 2.76  | CONCRETE | STEEL |
| FROM TABLE FOR 4'-3" "D"                                                                           | 2.28  | 208.6    |       |
| ADD (2 X QUANTITIES FOR 1-FOOT)                                                                    | 0.70  | 42.6     |       |
| ADD (6" = 2 X 3") (2 X QUANTITIES FOR 3")                                                          | 0.18  | 255.8    |       |
| SUBTOTAL                                                                                           | 3.16  | 255.8    |       |
| ADJUST QUANTITIES FOR THE PIPE OPENINGS (DEDUCT CONCRETE AND ADD STEEL FOR TWO 3' AND ONE 4' WALL) | -0.40 | +19.5    |       |
| TOTAL                                                                                              | 2.76  | 275.3    |       |
| USE                                                                                                | 2.80  | 280.0    |       |

MORE THAN 20-FOOT TO AND INCLUDING 30-FOOT DEPTH

FIRST, COMPUTE QUANTITIES FOR 20-FOOT DEPTH FROM THE TABLE "TO AND INCLUDING 20-FOOT DEPTHS".

FOR EXAMPLE: QUANTITIES FOR 3'-0" X 4'-0" MANHOLE WITH 20'-0", "D" HAVING ONE 18", ONE 24" AND ONE 36" PIPE OPENINGS ARE DETERMINED AS FOLLOWS:

"D" REQUIRED = 20'-0"  
"D" GIVEN IN TABLE = 4'-3"  
"D" ADDITIONAL = 15'-9"

|                                                                                                    |          |       |
|----------------------------------------------------------------------------------------------------|----------|-------|
|                                                                                                    | CONCRETE | STEEL |
| FROM TABLE FOR 4'-3" "D"                                                                           | 2.28     | 208.6 |
| ADD (15 X QUANTITIES FOR 1-FOOT)                                                                   | 5.25     | 319.9 |
| ADD (9" = 3 X 3") (3 X QUANTITIES FOR 3")                                                          | 0.27     | 6.9   |
| SUBTOTAL                                                                                           | 7.80     | 535.0 |
| ADJUST QUANTITIES FOR THE PIPE OPENINGS (DEDUCT CONCRETE AND ADD STEEL FOR TWO 3' AND ONE 4' WALL) | -0.40    | +19.5 |
| TOTAL                                                                                              | 7.40     | 554.5 |

SECOND, COMPUTE QUANTITIES FOR THE DEPTHS BEYOND 20 FEET TO A MAXIMUM OF 30 FEET, USING THE TABLE "20-FOOT TO AND INCLUDING 30-FOOT DEPTH", AND ADD TO THE QUANTITIES FOR 20-FOOT DEPTH. ALSO, ADD THE DIFFERENCE IN STEEL IN THE BOTTOM DUE TO THE INCREASE IN SIZE OF BARS FROM #4 TO #6 BARS ON 7-INCH CENTERS.

FOR EXAMPLE:  
"D" REQUIRED = 30'-0"  
"D" COMPUTED = 20'-0"  
"D" ADDITIONAL = 10'-0"

|                                           |          |        |
|-------------------------------------------|----------|--------|
|                                           | CONCRETE | STEEL  |
| ADD CONCRETE (10 X QUANTITIES FOR 1-FOOT) | 3.50     |        |
| ADD STEEL (10 X QUANTITIES FOR 1-FOOT)    | 242.70   |        |
| ADD STEEL (ADDITIONAL STEEL IN BOTTOM)    |          | 39.56  |
| TOTAL (30-FOOT DEPTH)                     | 10.90    | 836.76 |
| USE                                       | 10.9     | 840.0  |

| QUANTITIES    |   |                            |          |                          |       |                                |       |                                                         |
|---------------|---|----------------------------|----------|--------------------------|-------|--------------------------------|-------|---------------------------------------------------------|
| SIZE (W)      |   | TO AND INCLUDING 20' DEPTH |          |                          |       | 20' TO AND INCLUDING 30' DEPTH |       |                                                         |
|               |   | D= 3'-3"                   | D= 4'-3" | ADD OR SUBTRACT FOR EACH |       | ADD OR SUBTRACT FOR EACH       |       | ADDITIONAL STEEL IN BOTTOM DIFFERENCE IN #4 AND #6 BARS |
|               |   |                            |          | 1 FT.                    | 3 IN. | 1 FT.                          | 3 IN. |                                                         |
| 3'-0" X 3'-0" | C | 1.62                       | 1.93     | 0.31                     | 0.08  | 0.31                           | 0.08  |                                                         |
|               | S | 157.90                     | 176.80   | 18.60                    | 2.00  | 20.64                          | 5.16  | 30.14                                                   |
| 3'-0" X 3'-6" | C | 1.77                       | 2.11     | 0.33                     | 0.08  | 0.33                           | 0.08  |                                                         |
|               | S | 173.80                     | 194.60   | 20.60                    | 2.30  | 23.12                          | 5.78  | 34.85                                                   |
| 3'-0" X 4'-0" | C | 1.93                       | 2.28     | 0.35                     | 0.09  | 0.35                           | 0.09  |                                                         |
|               | S | 187.10                     | 208.60   | 21.30                    | 2.30  | 24.27                          | 6.07  | 39.56                                                   |
| 3'-0" X 4'-6" | C | 2.16                       | 2.53     | 0.38                     | 0.09  | 0.38                           | 0.09  |                                                         |
|               | S | 211.20                     | 234.70   | 23.30                    | 2.70  | 26.75                          | 6.69  | 44.26                                                   |
| 3'-0" X 5'-0" | C | 2.32                       | 2.71     | 0.40                     | 0.10  | 0.40                           | 0.10  |                                                         |
|               | S | 219.60                     | 243.80   | 24.00                    | 2.70  | 27.90                          | 6.97  | 48.97                                                   |
| 3'-6" X 3'-6" | C | 1.94                       | 2.29     | 0.35                     | 0.09  | 0.35                           | 0.09  |                                                         |
|               | S | 192.40                     | 215.10   | 22.70                    | 2.70  | 25.60                          | 6.40  | 40.27                                                   |
| 3'-6" X 4'-0" | C | 2.10                       | 2.48     | 0.38                     | 0.09  | 0.38                           | 0.09  |                                                         |
|               | S | 204.30                     | 227.70   | 23.40                    | 2.70  | 26.75                          | 6.69  | 45.69                                                   |
| 3'-6" X 4'-6" | C | 2.35                       | 2.75     | 0.40                     | 0.10  | 0.40                           | 0.10  |                                                         |
|               | S | 230.00                     | 255.50   | 25.30                    | 3.00  | 29.23                          | 7.31  | 51.11                                                   |
| 3'-6" X 5'-0" | C | 2.53                       | 2.95     | 0.42                     | 0.10  | 0.42                           | 0.10  |                                                         |
|               | S | 240.90                     | 267.10   | 26.00                    | 3.00  | 30.38                          | 7.60  | 56.53                                                   |
| 4'-0" X 4'-0" | C | 2.28                       | 2.68     | 0.40                     | 0.10  | 0.40                           | 0.10  |                                                         |
|               | S | 216.70                     | 240.80   | 24.10                    | 2.70  | 27.90                          | 6.97  | 51.83                                                   |
| 4'-0" X 4'-6" | C | 2.55                       | 2.97     | 0.42                     | 0.10  | 0.42                           | 0.10  |                                                         |
|               | S | 246.40                     | 272.60   | 26.00                    | 3.00  | 30.38                          | 7.60  | 57.96                                                   |
| 4'-0" X 5'-0" | C | 2.74                       | 3.18     | 0.44                     | 0.11  | 0.44                           | 0.11  |                                                         |
|               | S | 255.60                     | 282.50   | 26.70                    | 3.00  | 31.53                          | 7.88  | 64.10                                                   |
| 4'-6" X 4'-6" | C | 2.75                       | 3.19     | 0.44                     | 0.11  | 0.44                           | 0.11  |                                                         |
|               | S | 276.80                     | 304.90   | 28.00                    | 3.30  | 32.86                          | 8.22  | 64.81                                                   |
| 4'-6" X 5'-0" | C | 2.94                       | 3.41     | 0.46                     | 0.12  | 0.46                           | 0.12  |                                                         |
|               | S | 289.40                     | 318.20   | 28.70                    | 3.30  | 34.01                          | 8.50  | 71.66                                                   |
| 5'-0" X 5'-0" | C | 3.15                       | 3.64     | 0.48                     | 0.12  | 0.48                           | 0.12  |                                                         |
|               | S | 299.80                     | 329.30   | 29.40                    | 3.30  | 35.16                          | 8.79  | 79.23                                                   |



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
KATHRYN PHILLIPS HARVEY  
NUMBER PE-23751  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
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ELECTRONICALLY.

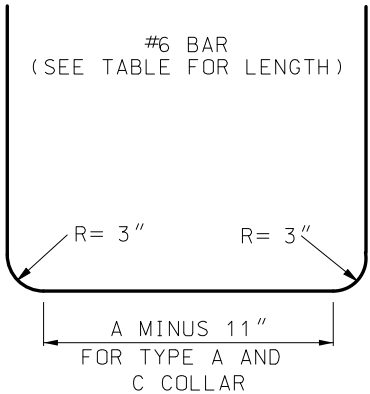
CONCRETE MANHOLES

DATE EFFECTIVE: 02-01-2009  
DATE PREPARED: 8/26/2009

604.30G

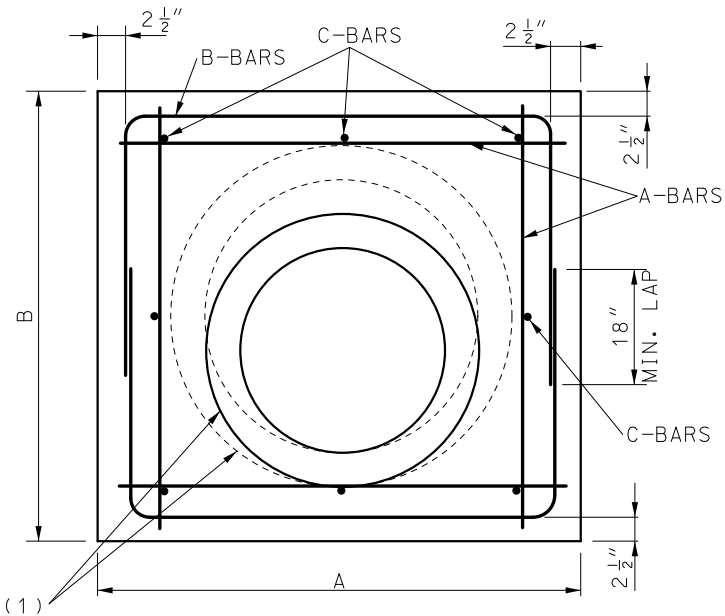
SHEET NO.  
2 OF 2

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

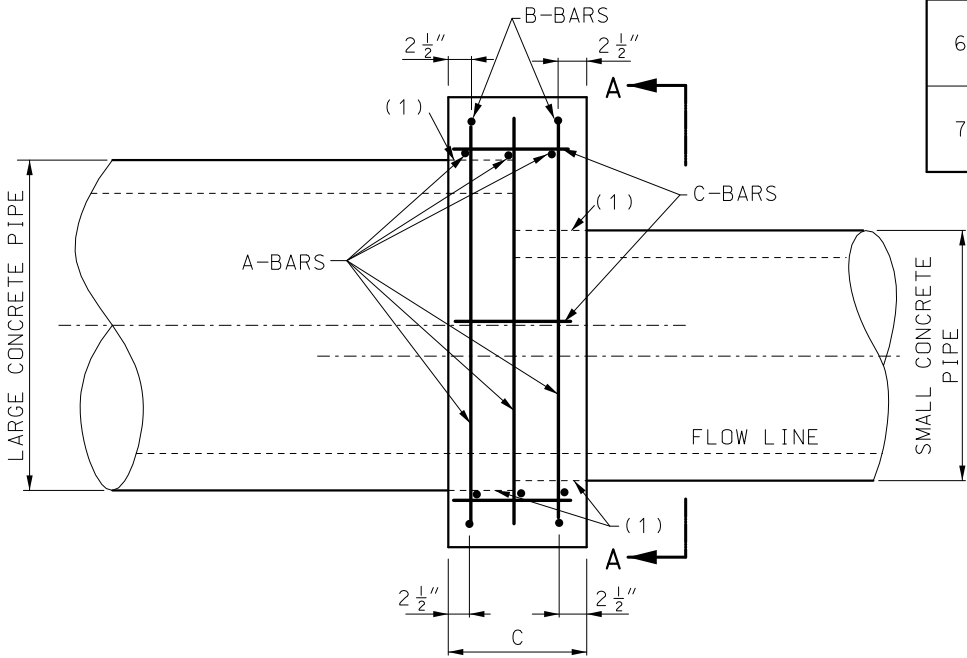


BENDING DIAGRAM FOR B-BARS

(1) ONE LAYER COMMERCIALY AVAILABLE  
55-POUND ROLL ROOFING.



SECTION A-A



ELEVATION  
(FOR PIPES OF DISSIMILAR  
SIZE OR MATERIAL)

TYPE A COLLAR

TABLE OF DIMENSIONS

| SIZE OF PIPE |                | DIMENSIONS      |             | LENGTH OF BARS               |                             |                             | QUANTITIES           |              |
|--------------|----------------|-----------------|-------------|------------------------------|-----------------------------|-----------------------------|----------------------|--------------|
| LARGE (IN.)  | SMALL (IN.)    | A & B (FT.-IN.) | C (FT.-IN.) | A (#5) 12 REQUIRED (FT.-IN.) | B (#6) 4 REQUIRED (FT.-IN.) | C (#4) 8 REQUIRED (FT.-IN.) | CONCRETE (CU. YD.)   | STEEL (LBS.) |
| 12           | 12             | 2-8             | 1-0         | 2-5                          | 5-10                        | 0-9                         | 0.21                 | 70           |
| 15           | 12<br>15       | 3-0             | 1-0         | 2-9                          | 6-6                         | 0-9                         | 0.27<br>0.25         | 77           |
| 18           | 12<br>15<br>18 | 3-3             | 1-0         | 3-0                          | 7-0                         | 0-9                         | 0.33<br>0.32<br>0.30 | 84           |
| 21           | 12<br>15<br>18 | 3-6             | 1-0         | 3-3                          | 7-6                         | 0-9                         | 0.36<br>0.34<br>0.33 | 90           |
| 24           | 15<br>18<br>24 | 3-10            | 1-0         | 3-6                          | 8-2                         | 0-9                         | 0.44<br>0.40<br>0.36 | 97           |
| 30           | 18<br>24<br>30 | 4-5             | 1-4         | 4-2                          | 9-4                         | 1-0                         | 0.71<br>0.66<br>0.60 | 114          |
| 36           | 24<br>30<br>36 | 5-0             | 1-4         | 4-9                          | 10-6                        | 1-0                         | 0.88<br>0.79<br>0.76 | 128          |
| 42           | 30<br>36<br>42 | 5-7             | 1-4         | 5-4                          | 11-8                        | 1-0                         | 1.05<br>0.98<br>0.89 | 142          |
| 48           | 36<br>42<br>48 | 6-2             | 1-4         | 6-0                          | 12-10                       | 1-0                         | 1.22<br>1.13<br>1.03 | 158          |
| 54           | 42<br>48<br>54 | 7-1             | 1-8         | 6-9                          | 14-8                        | 1-6                         | 2.02<br>1.90<br>1.76 | 181          |
| 60           | 48<br>54<br>60 | 7-8             | 1-8         | 7-5                          | 15-10                       | 1-6                         | 2.27<br>2.13<br>1.97 | 196          |
| 66           | 54<br>60<br>66 | 8-3             | 2-0         | 8-0                          | 17-0                        | 1-9                         | 3.04<br>2.85<br>2.65 | 210          |
| 72           | 60<br>66<br>72 | 8-10            | 2-0         | 7-7                          | 18-2                        | 1-9                         | 3.36<br>3.16<br>2.93 | 225          |

GENERAL NOTES:

FOR PIPE EXTENSIONS THAT ARE 5 FEET IN LENGTH OR SHORTER, A SMOOTH TAPERED SLEEVE MAY BE USED IN LIEU OF A TYPE A COLLAR, IF APPROVED BY THE ENGINEER. SEE SMOOTH TAPERED SLEEVE DETAIL IN STANDARD PLAN 732.00.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER

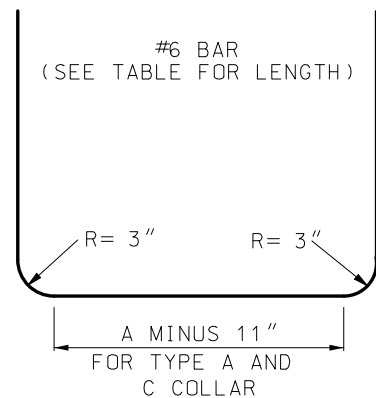
THIS SHEET HAS BEEN  
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PIPE COLLARS  
TYPE A

DATE EFFECTIVE: 07/01/2021  
DATE PREPARED: 4/29/2021

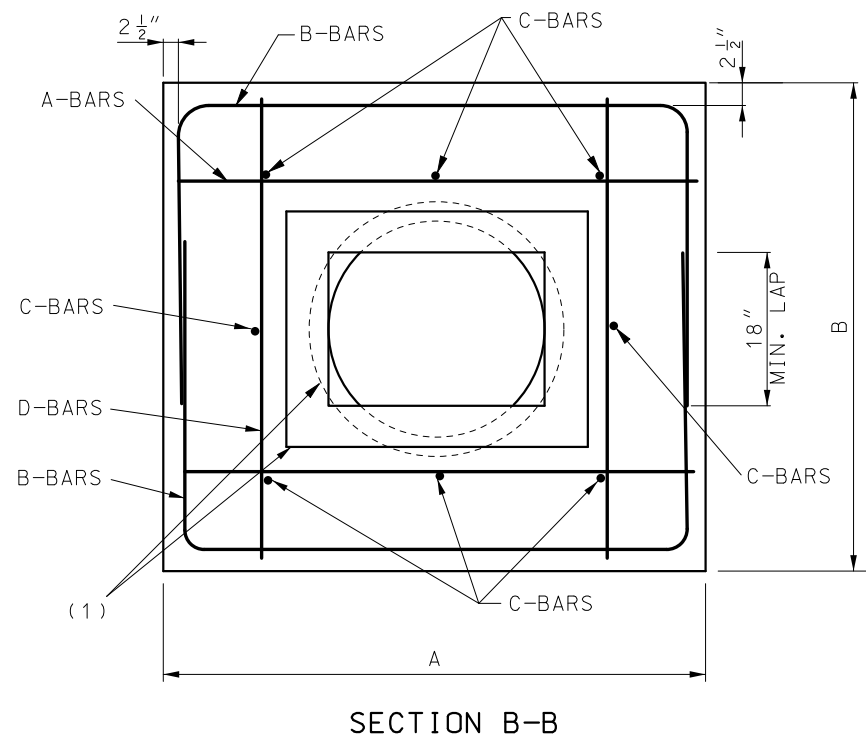
604.40G

SHEET NO.  
1 OF 2



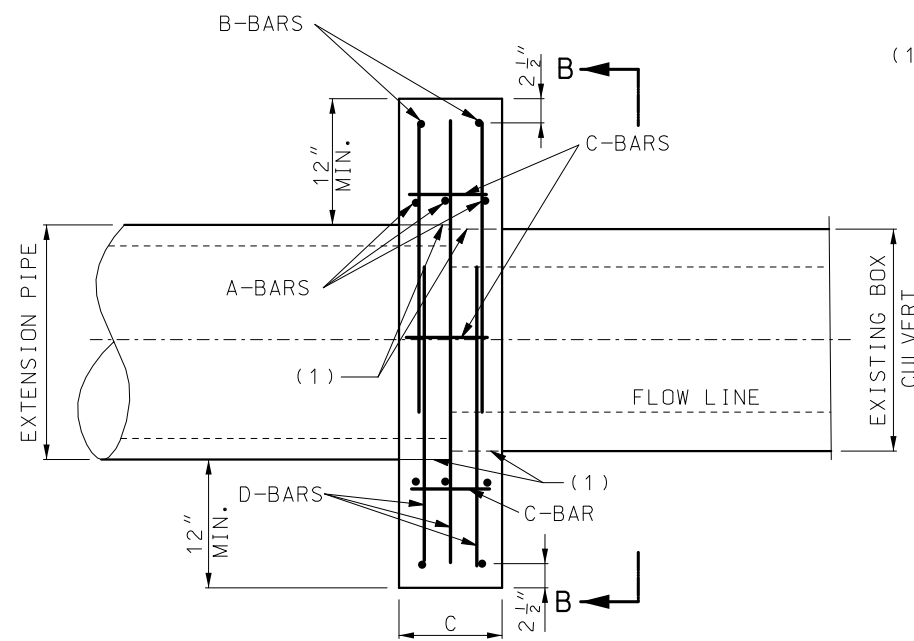
BENDING DIAGRAM FOR B-BARS

| TABLE OF DIMENSIONS |                 |             |             |             |                             |                             |                             |                             |                   |              |
|---------------------|-----------------|-------------|-------------|-------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------|--------------|
| BOX SIZE (FT.)      | PIPE SIZE (IN.) | DIMENSIONS  |             |             | LENGTH OF BARS              |                             |                             |                             | QUANTITIES        |              |
|                     |                 | A (FT.-IN.) | B (FT.-IN.) | C (FT.-IN.) | A (#5) 6 REQUIRED (FT.-IN.) | B (#6) 4 REQUIRED (FT.-IN.) | C (#4) 8 REQUIRED (FT.-IN.) | D (#5) 6 REQUIRED (FT.-IN.) | CONCRETE (CU.YD.) | STEEL (LBS.) |
| 2 x 1 1/2           | 24              | 5-1         | 4-9         | 1-0         | 4-10                        | 10-4                        | 0-9                         | 4-6                         | 0.65              | 124          |
| 2 x 2               | 30              | 5-3         | 5-3         | 1-4         | 5-0                         | 11-0                        | 1-0                         | 5-0                         | 0.93              | 134          |
| 3 x 2               | 36              | 6-1         | 5-10        | 1-4         | 5-10                        | 12-5                        | 1-0                         | 5-7                         | 1.16              | 151          |
| 3 x 3               | 42              | 6-5         | 6-5         | 1-4         | 6-0                         | 13-4                        | 1-0                         | 6-0                         | 1.29              | 162          |



SECTION B-B

TYPE C COLLAR



ELEVATION  
(FOR BOX CULVERT TO PIPE)

(1) ONE LAYER COMMERCIALY AVAILABLE  
55-POUND ROLL ROOFING.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

TRAVIS D. KOESTNER

NUMBER PE-30042

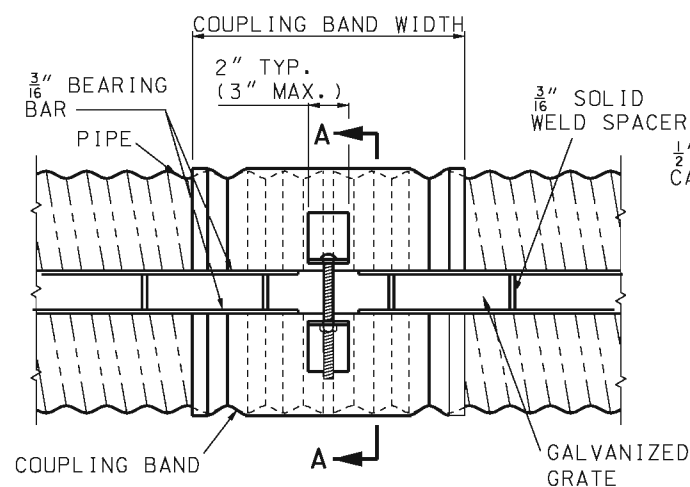
PROFESSIONAL ENGINEER

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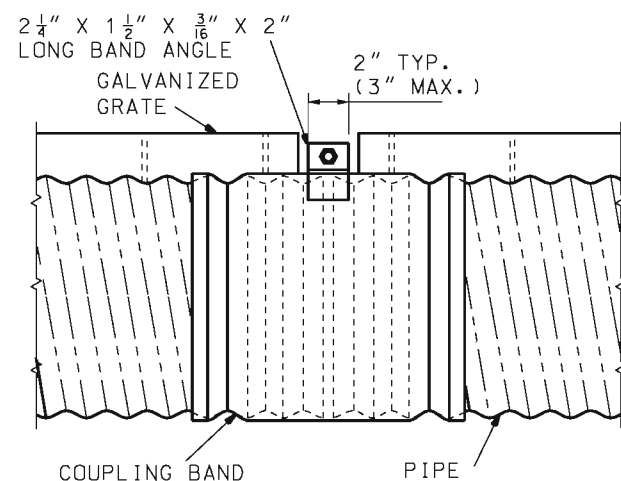
PIPE COLLARS  
TYPE C

|                            |         |                     |
|----------------------------|---------|---------------------|
| DATE EFFECTIVE: 07/01/2021 | 604.40G | SHEET NO.<br>2 OF 2 |
| DATE PREPARED: 4/29/2021   |         |                     |

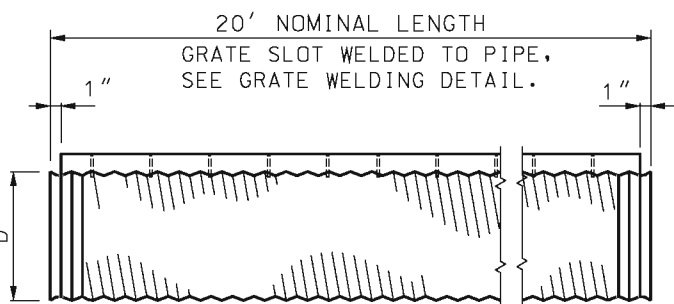




TOP VIEW



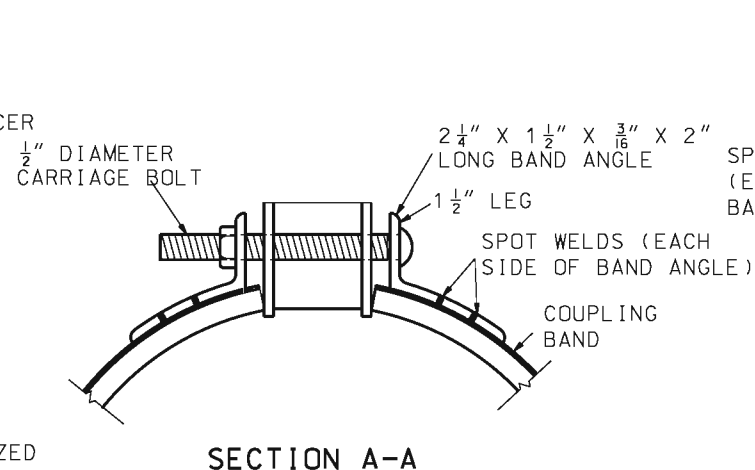
SIDE VIEW  
TYPICAL COUPLING BAND



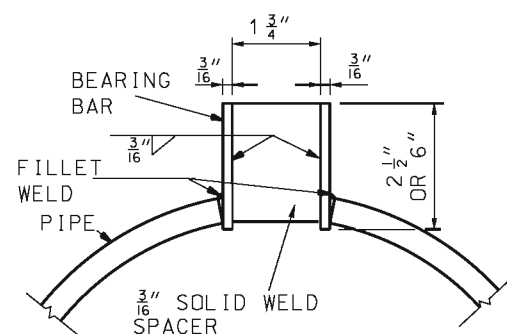
TYPICAL PIPE SECTION

D = { 1 1/2", 2", 2 1/2", 3", 4", 6" }

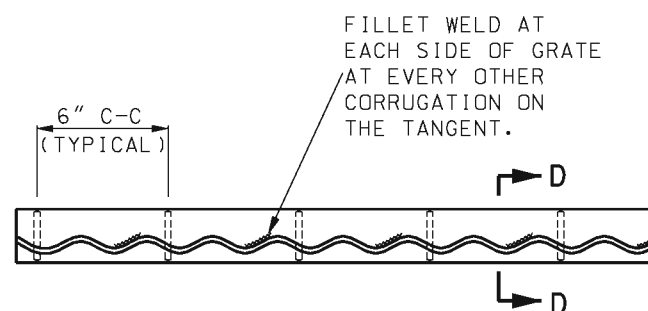
STRUCTURAL STEEL SLOTTED DRAIN  
(TYPE B)



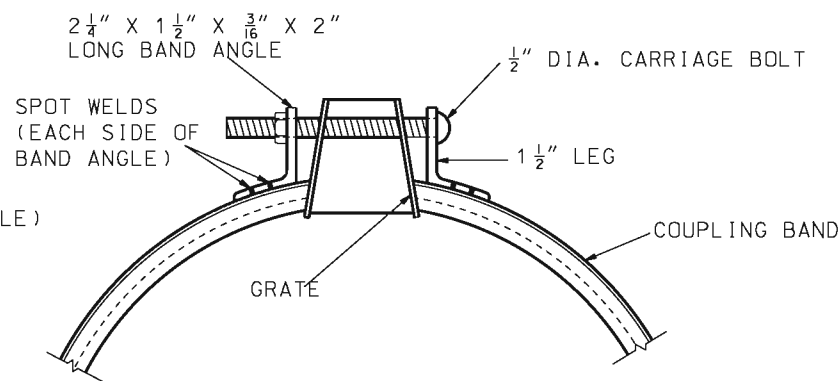
SECTION A-A



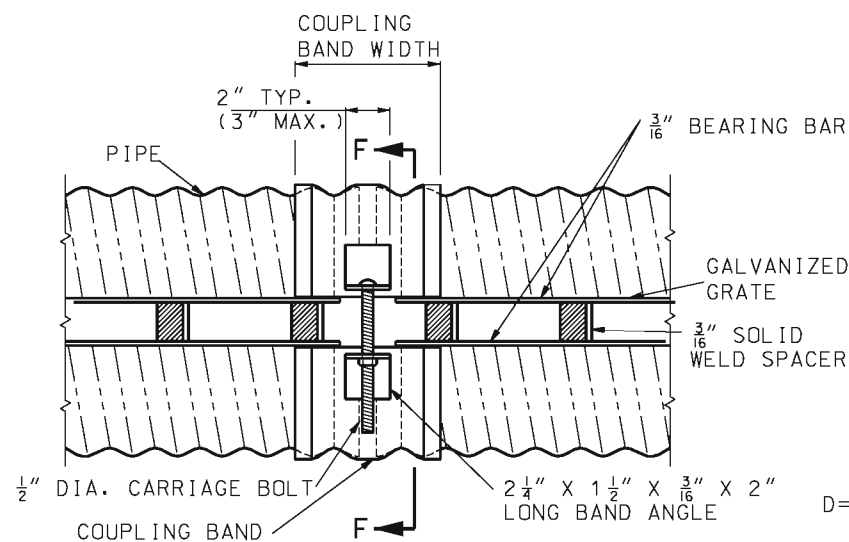
SECTION D-D



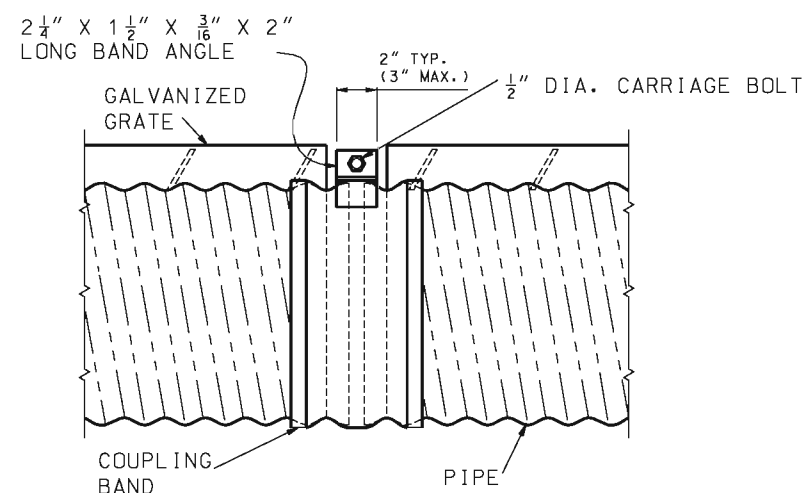
GRATE WELDING DETAIL



SECTION F-F



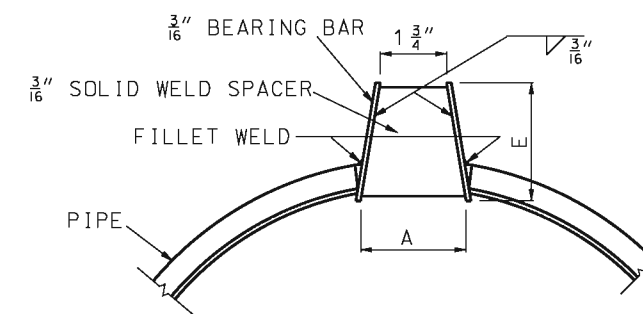
TOP VIEW



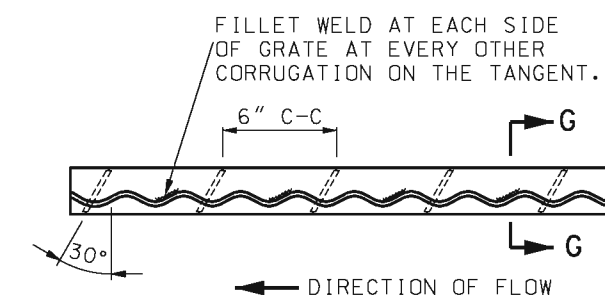
SIDE VIEW  
TYPICAL COUPLING BAND

STRUCTURAL STEEL SLOTTED DRAIN  
(TYPE C)

| GRATE TYPE | "E"    | "A"    |
|------------|--------|--------|
| C          | 2 1/2" | 2 1/4" |
| C          | 6"     | 3"     |

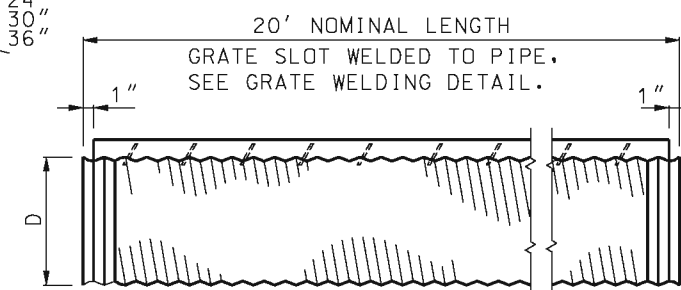


SECTION G-G



GRATE WELDING DETAIL

D = { 1 1/2", 2", 2 1/2", 3", 4", 6" }



TYPICAL PIPE SECTION

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

KATHRYN PHILLIPS HARVEY

NUMBER PE-23751

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE EFFECTIVE: 03/01/1994

DATE PREPARED: 8/21/2009

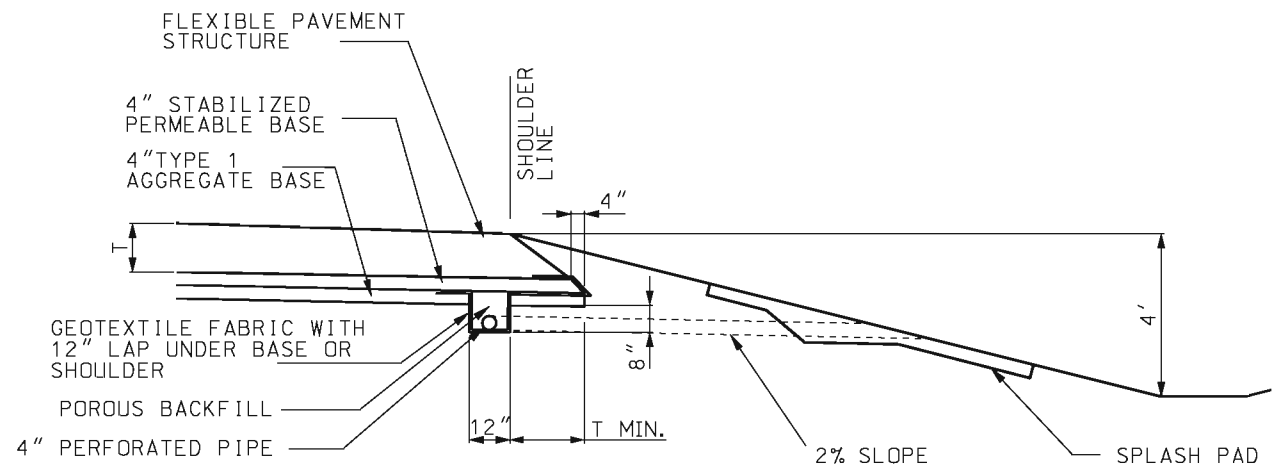
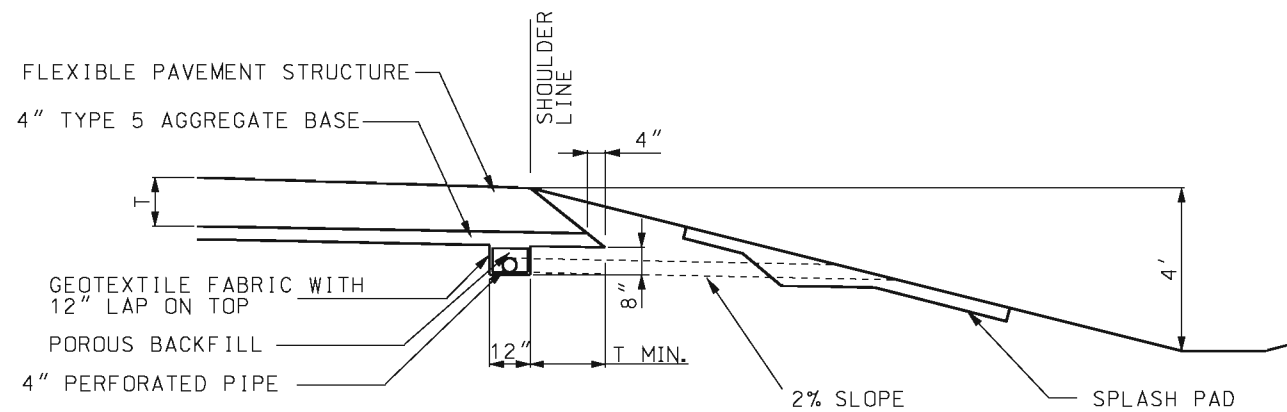
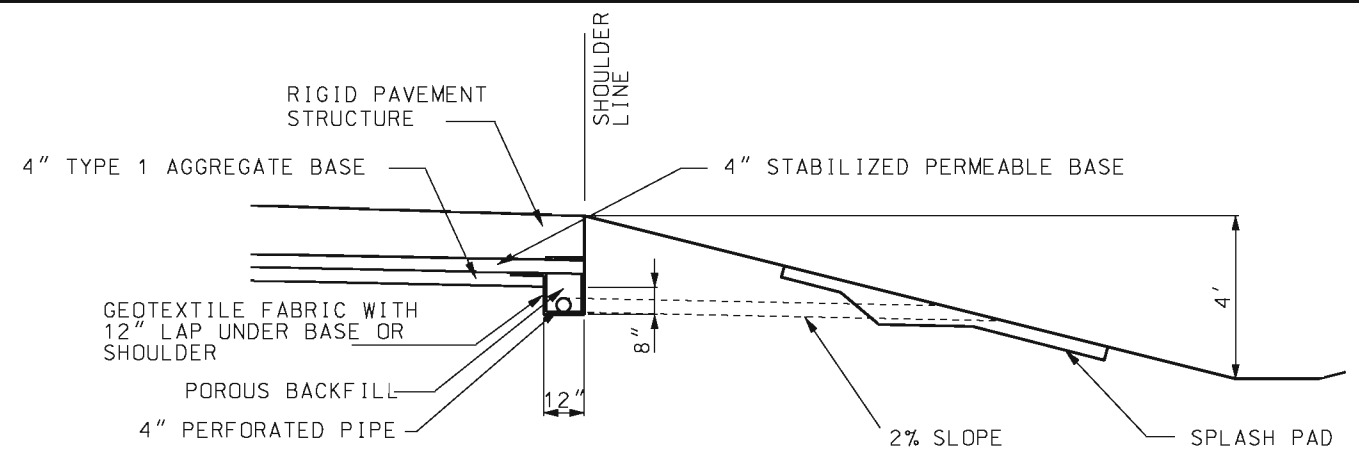
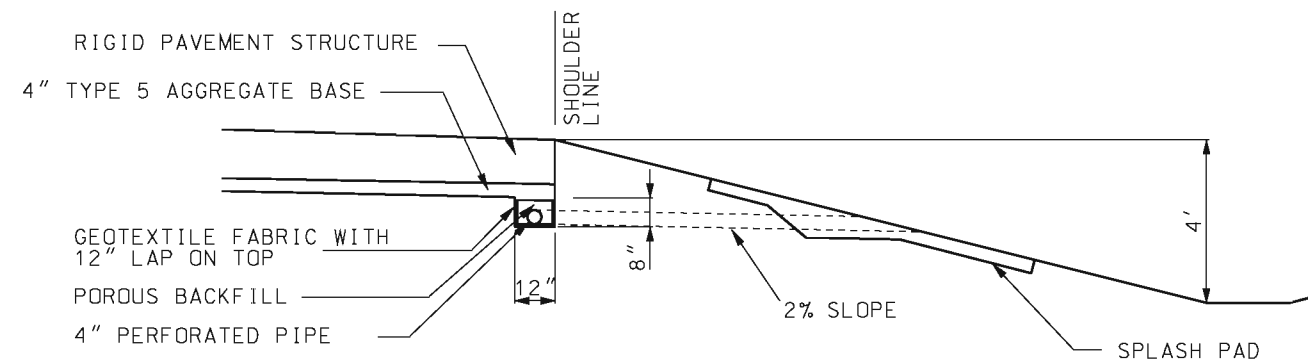
**604.70**

SHEET NO.

2 OF 2

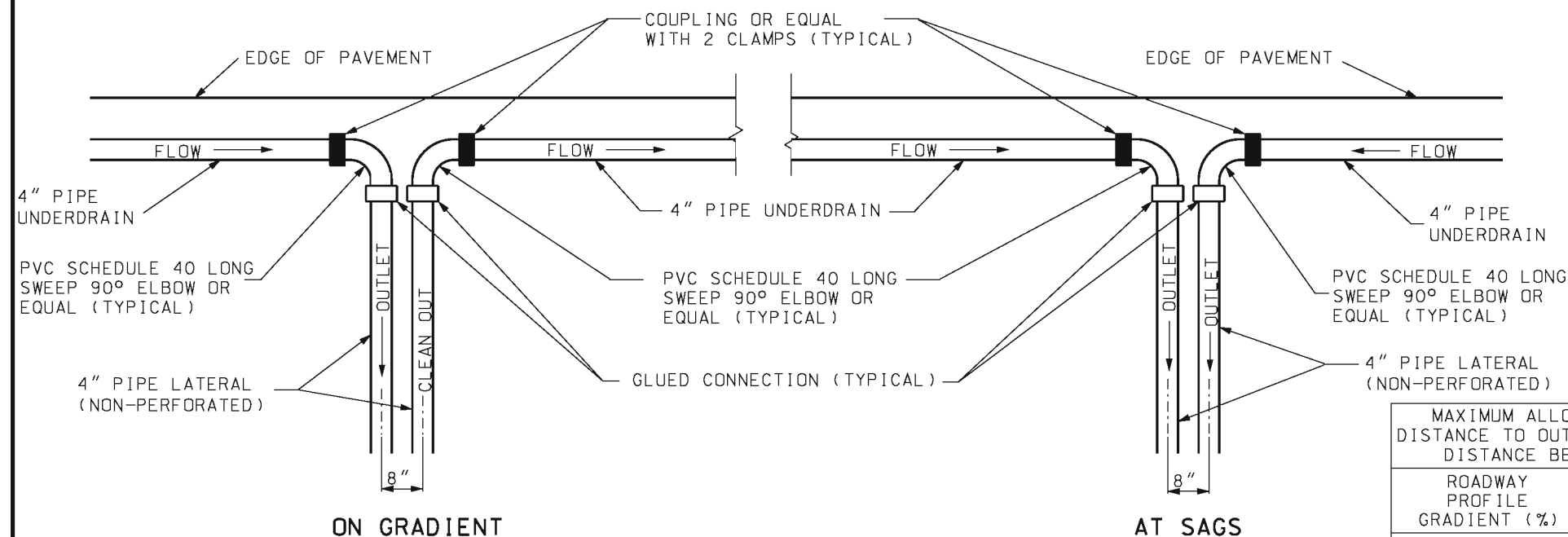
**SLOTTED DRAIN**

TYPE B AND TYPE C



MEDIUM DUTY

HEAVY DUTY



DETAIL OF PIPE AGGREGATE DRAIN OUTLETS

| MAXIMUM ALLOWABLE DRAINAGE<br>DISTANCE TO OUTLET OR SEPARATION<br>DISTANCE BETWEEN OUTLETS |          |
|--------------------------------------------------------------------------------------------|----------|
| ROADWAY<br>PROFILE<br>GRADIENT (%)                                                         | DISTANCE |
| ≤ 1                                                                                        | 250 FT.  |
| > 1 AND ≤ 2                                                                                | 375 FT.  |
| > 2                                                                                        | 500 FT.  |

GENERAL NOTES:

ON SUPERELEVATED CURVES PLACE LONGITUDINAL UNDERDRAIN ON LOW SIDE ONLY.

CONSTRUCT OUTLETS AT LOW POINT OF SAG CURVE.

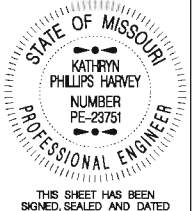


**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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**PAVEMENT UNDERDRAINAGE**

PIPE AGGREGATE PAVEMENT  
EDGE DRAINS FOR  
FULL DEPTH SHOULDERS



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ELECTRONICALLY.

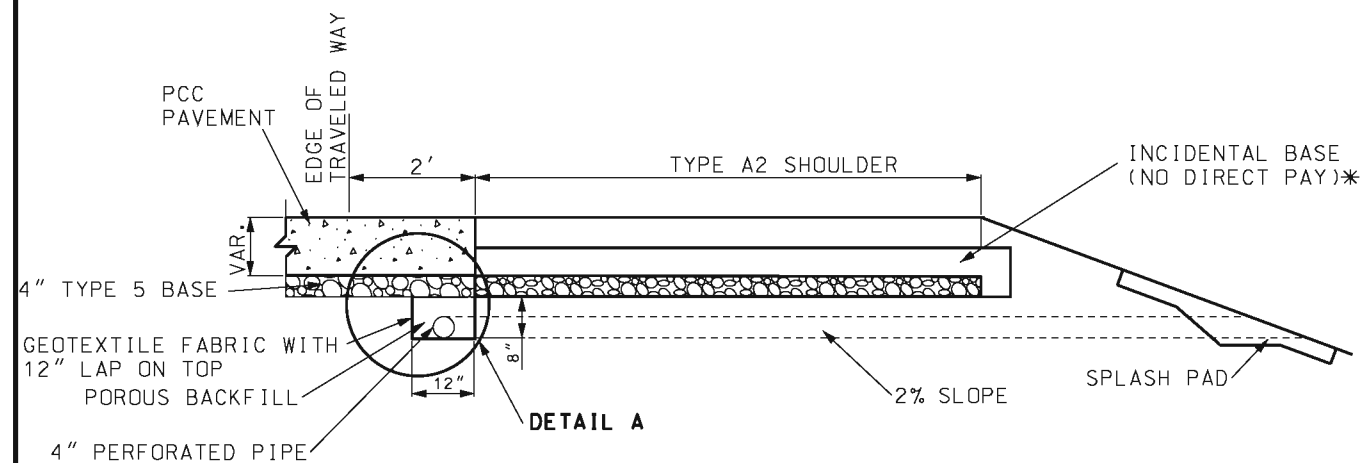
**605.101**

SHEET NO.  
1 OF 4

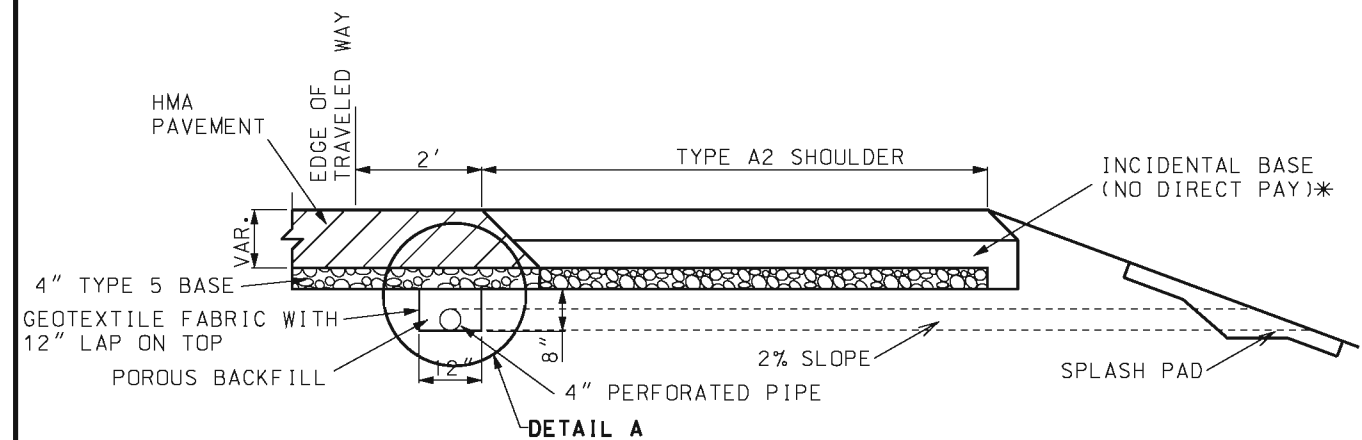
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DATE PREPARED: 4/1/2013

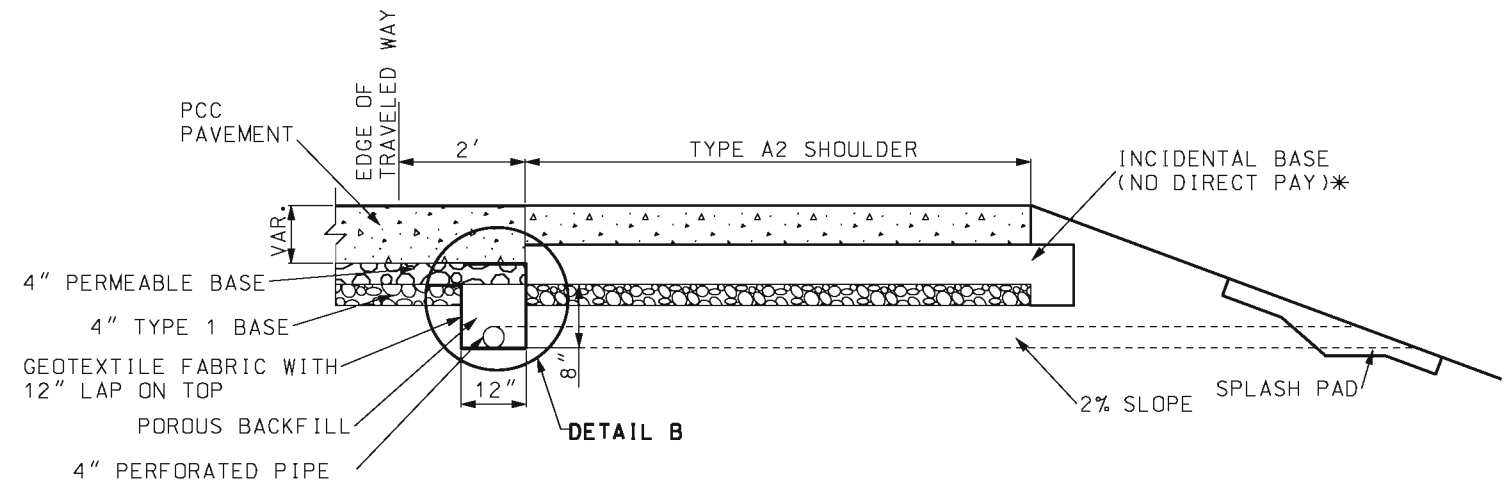




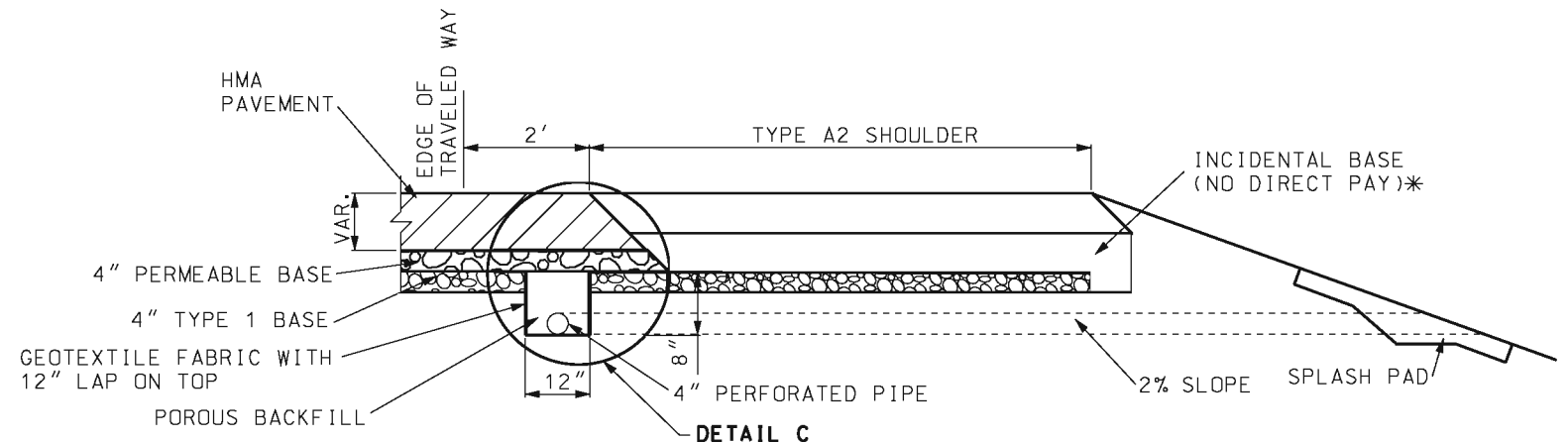
**RIGID PAVEMENT WITH TYPE 5 BASE**



**FLEXIBLE PAVEMENT WITH TYPE 5 BASE**



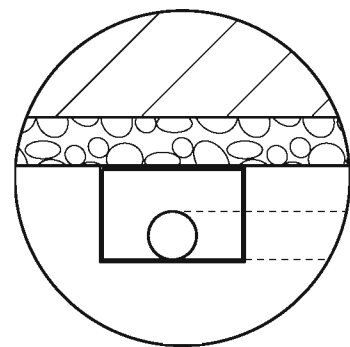
**RIGID PAVEMENT WITH PERMEABLE BASE**



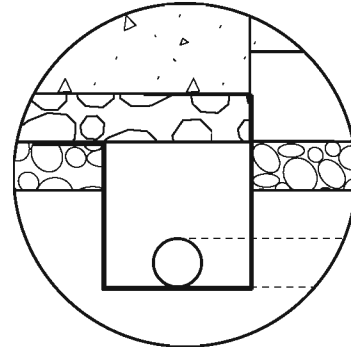
**FLEXIBLE PAVEMENT WITH PERMEABLE BASE**

-  PCC (PORTLAND CEMENT CONCRETE)
-  HMA (HOT MIX ASPHALT)
-  BASE

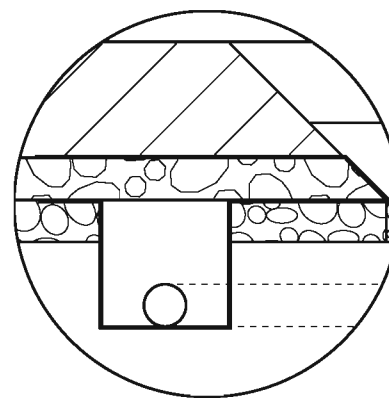
\* BASE MATERIAL (ASPHALT MILLINGS, RECYCLED CONCRETE, TYPE 1 BASE, ETC.) APPROVED BY THE ENGINEER.



DETAIL A



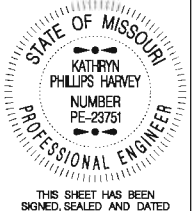
DETAIL B

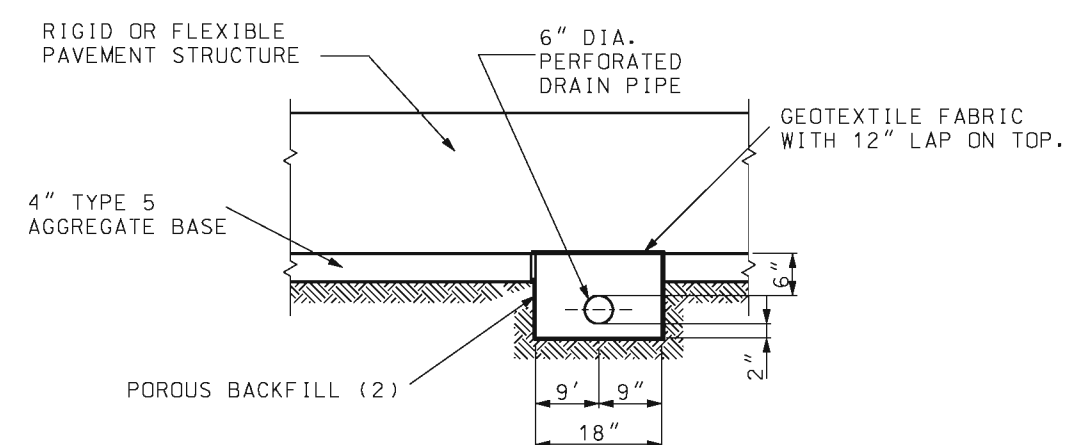


DETAIL C

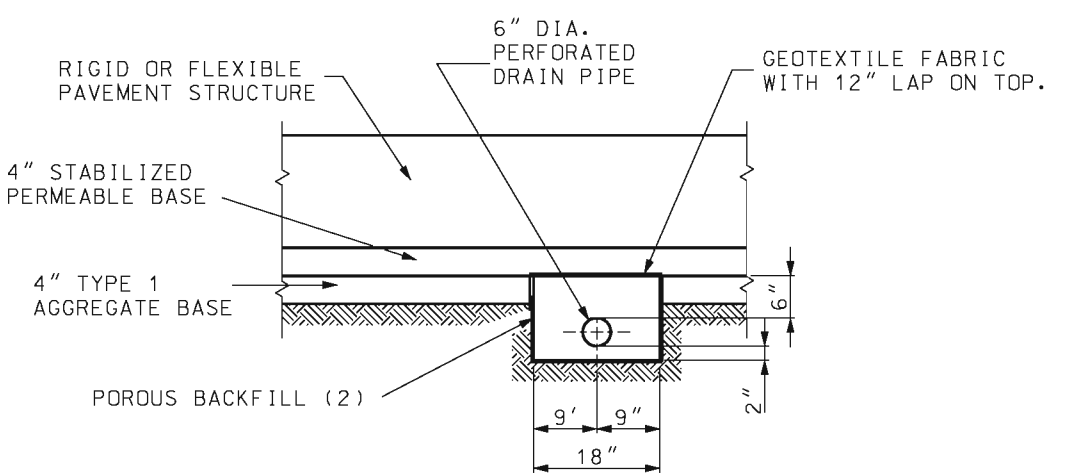
GENERAL NOTES:

SEE DETAIL OF PIPE AGGREGATE DRAIN OUTLETS ON SHEET 1.

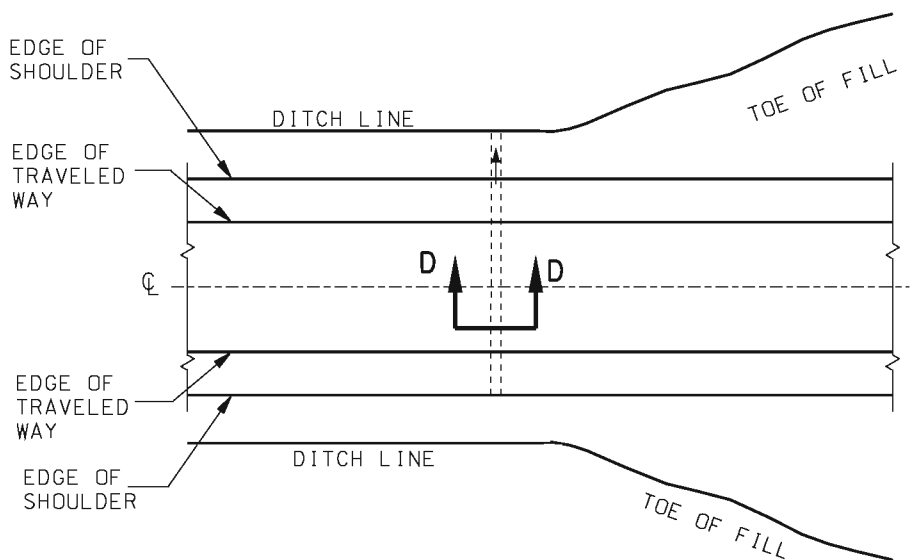
|                                                                                                                                                                                                                                  |                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                  |
|                                                                                                                                             | <b>PAVEMENT UNDERDRAINAGE</b><br>PIPE AGGREGATE PAVEMENT<br>EDGE DRAINS FOR<br>TYPE A2 SHOULDERS |
| DATE EFFECTIVE: 06/01/2013<br>DATE PREPARED: 4/1/2013                                                                                                                                                                            | <b>605.101</b>                                                                                   |
| SHEET NO.<br>2 OF 4                                                                                                                                                                                                              |                                                                                                  |



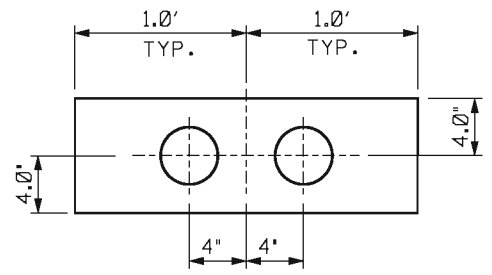
SECTION D-D  
WITHOUT PERMEABLE BASE



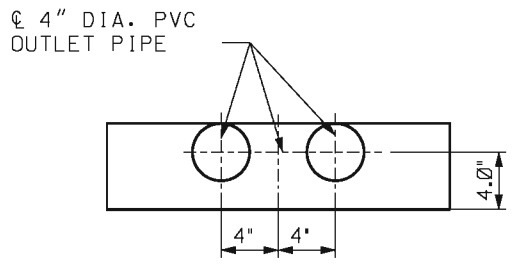
SECTION D-D  
WITH PERMEABLE BASE



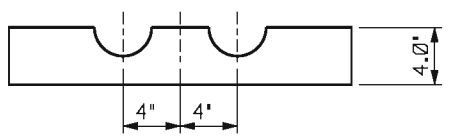
CROSS DRAIN



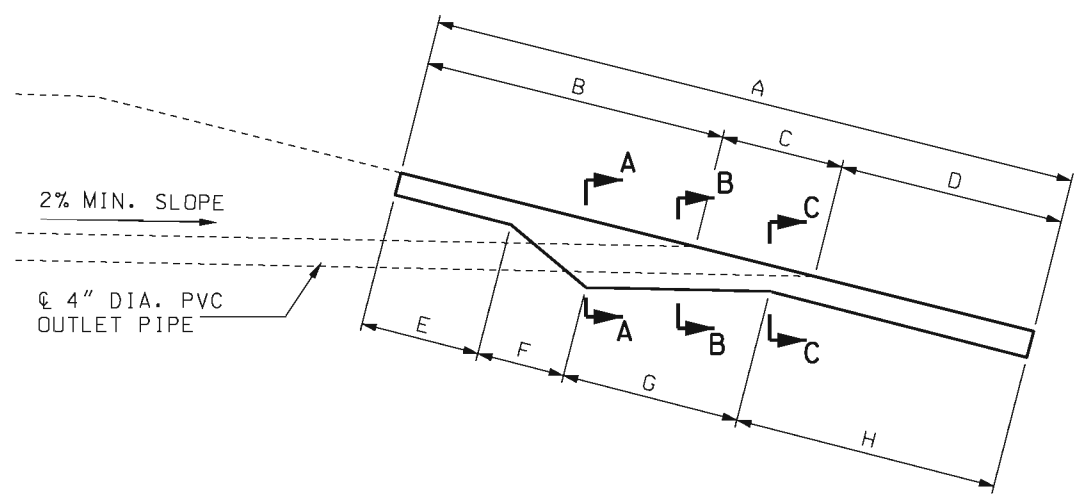
SECTION A-A



SECTION B-B



SECTION C-C



CONCRETE SPLASH PADS

| ITEM  | 2:1       | 3:1       | 4:1       | 6:1       |
|-------|-----------|-----------|-----------|-----------|
| A     | 5.48'     | 6.19'     | 6.95'     | 8.58'     |
| B     | 2.70'     | 3.07'     | 3.46'     | 4.28'     |
| C     | 0.78'     | 1.12'     | 1.49'     | 2.30'     |
| D     | 2.00'     | 2.00'     | 2.00'     | 2.00'     |
| E     | 2.00'     | 2.00'     | 2.00'     | 2.00'     |
| F     | 0.46'     | 0.61'     | 0.78'     | 1.18'     |
| G     | 0.71'     | 1.07'     | 1.46'     | 2.27'     |
| H     | 2.31'     | 2.51'     | 2.71'     | 3.13'     |
| CONC. | 0.15 C.Y. | 0.17 C.Y. | 0.20 C.Y. | 0.25 C.Y. |

GENERAL NOTES:

PRECAST CONCRETE SPLASH PADS MAY BE INSTALLED AS APPROVED BY THE ENGINEER.

TOP OF SPLASH PAD SHALL MATCH EXISTING CROSS SLOPE. CONSTRUCT BEND IN SPLASH PAD WHERE CROSS SLOPE CHANGES.

DIMENSIONS ARE APPROXIMATE AND CAN BE ADJUSTED AS DIRECTED BY THE ENGINEER.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PAVEMENT UNDERDRAINAGE  
CROSS DRAINS**



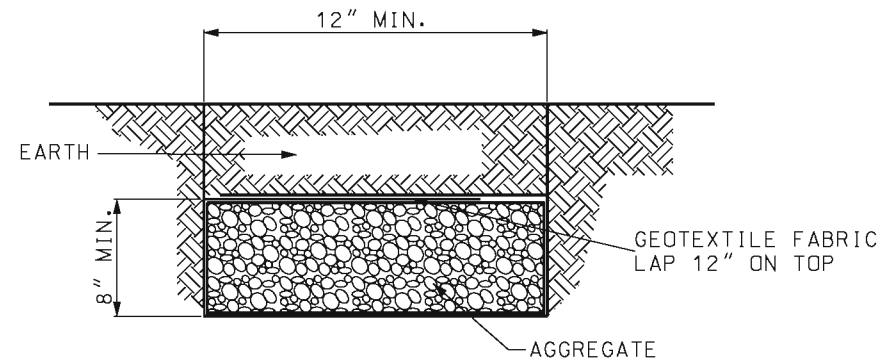
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

DATE EFFECTIVE: 06/01/2013

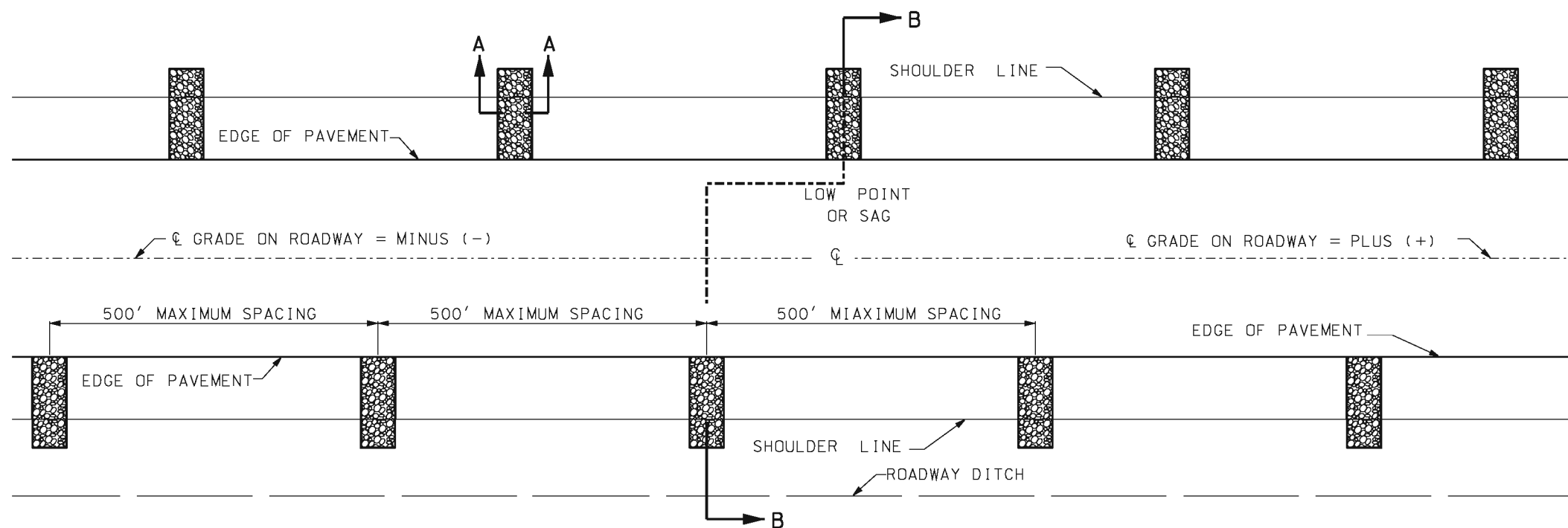
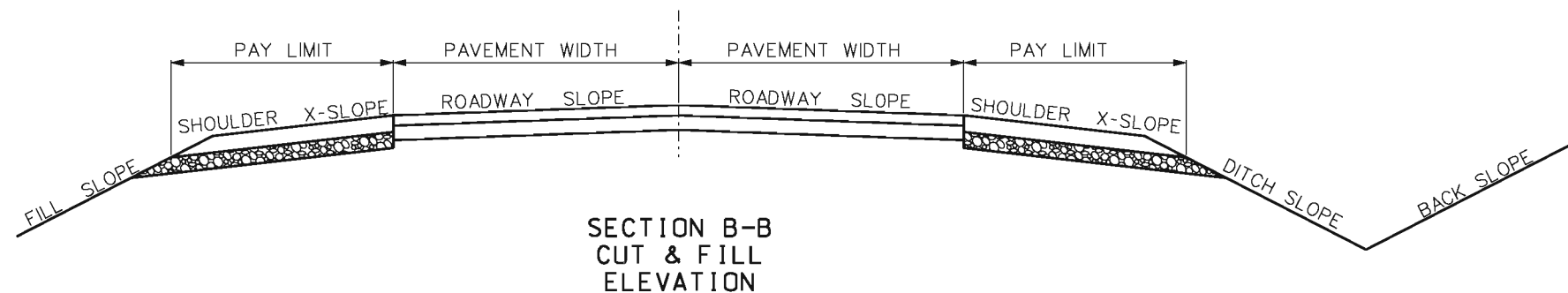
DATE PREPARED: 4/1/2013

**605.101**

SHEET NO.  
3 OF 4



SECTION A-A



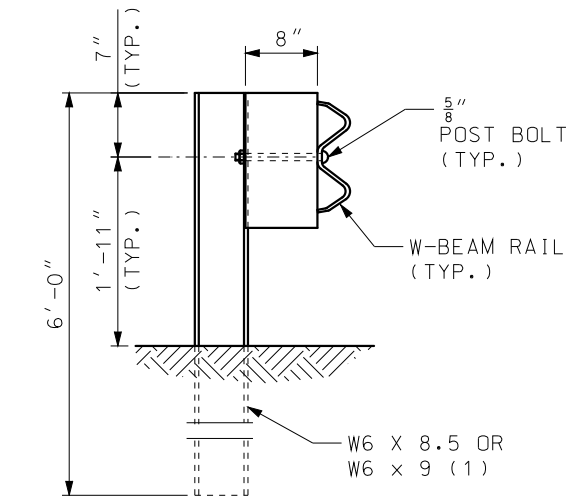
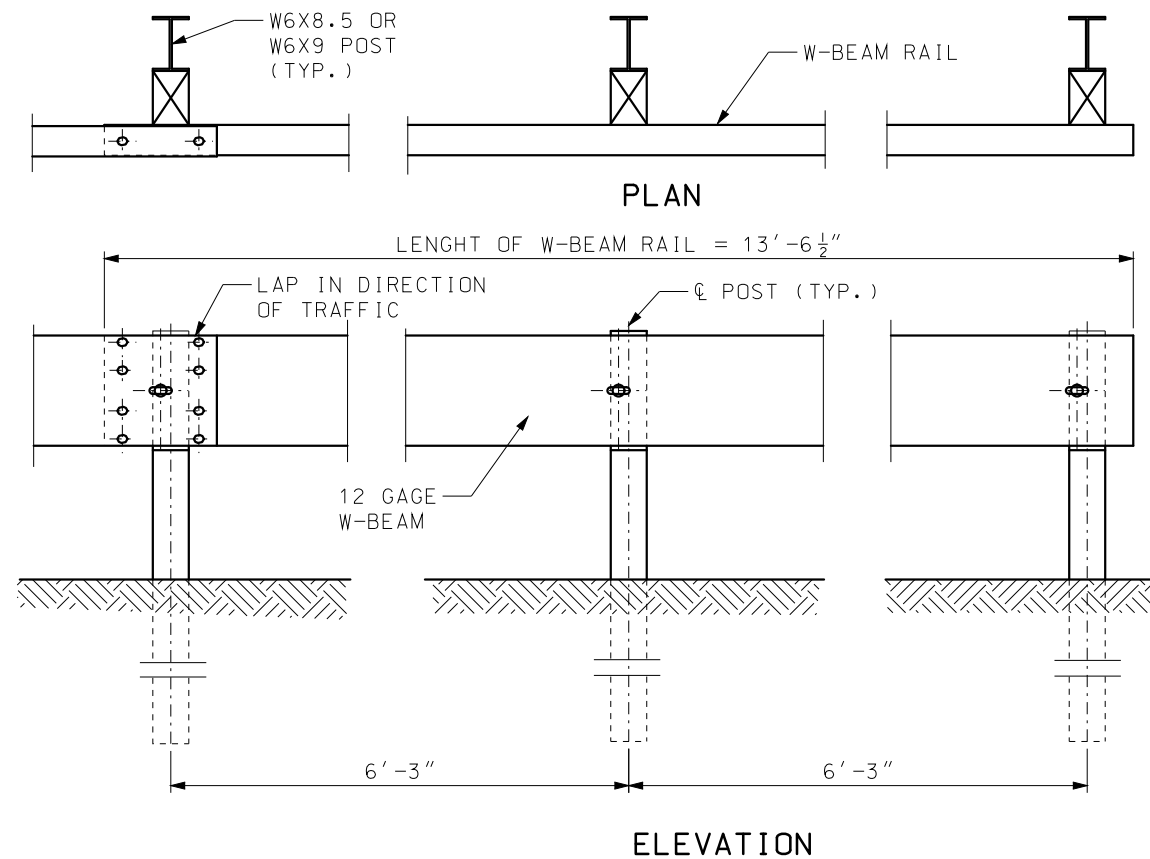
GENERAL NOTES:

AGGREGATE UNDERDRAIN TO BE USED ONLY WHERE DESIGNATED ON PLANS.

AGGREGATE UNDERDRAIN SHALL BE PLACED AT THE LOW POINT OF THE SAG AND THE SPACING OF AGGREGATE UNDERDRAIN SHALL BE APPROX. 500'. AGGREGATE UNDERDRAINS WILL BE OMITTED ON THE CREST VERTICAL CURVES AND ON THE HIGH SIDE OF SUPERELEVATION. THE LOW SIDE OF SUPERELEVATION SPACING MAY BE DECREASED AS DIRECTED BY ENGINEER.

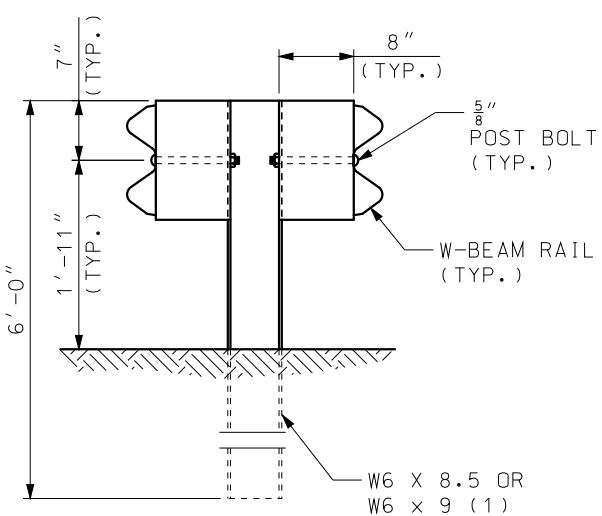
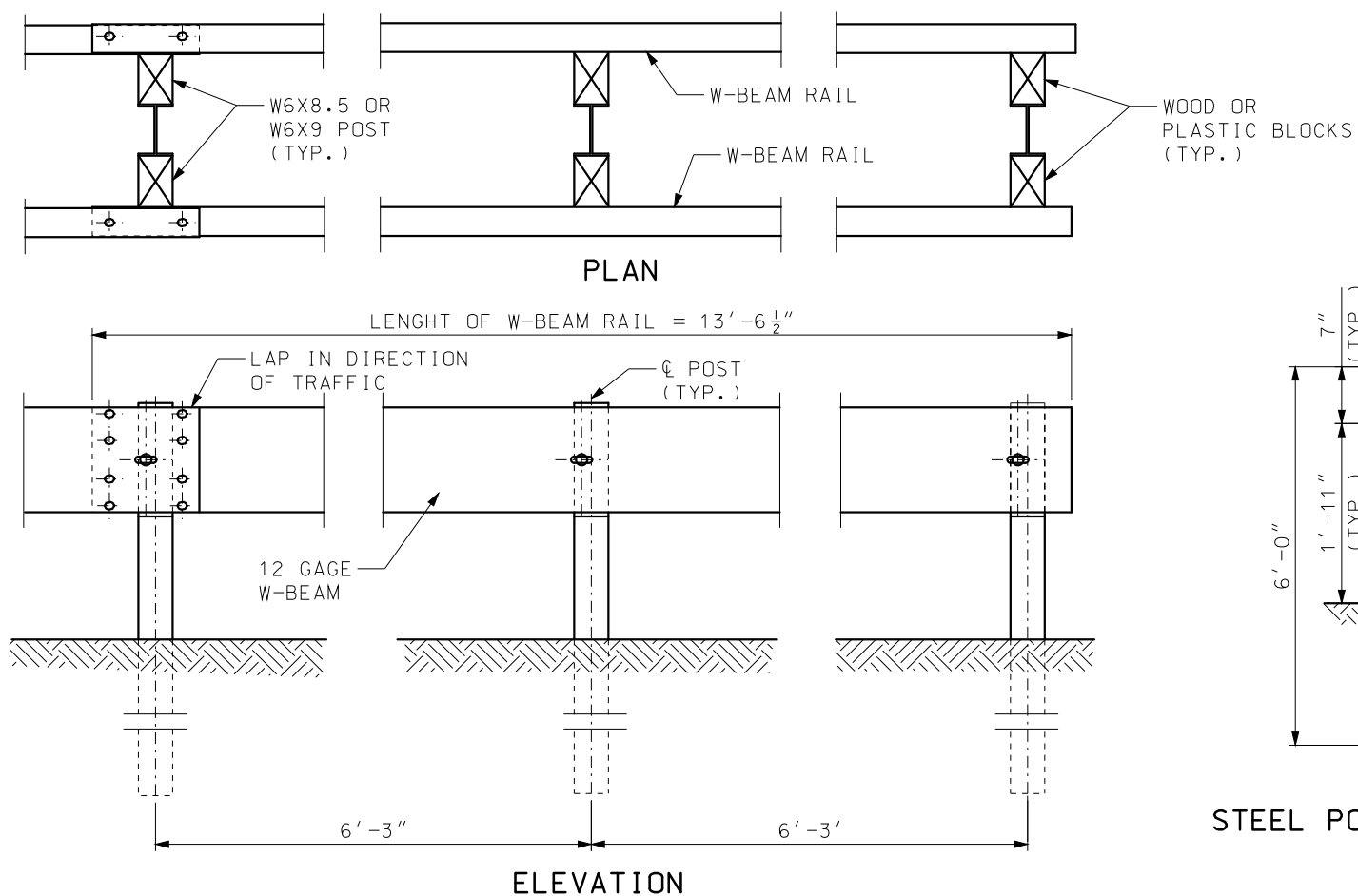
THE BOTTOM OF THE AGGREGATE DRAINS SHALL BE AT OR BELOW THE BOTTOM OF THE PAVEMENT'S AGGREGATE SUBBASE AT THE POINT OF CONTACT. THE TOP OF THE AGGREGATE DRAINS SHALL BE NO HIGHER THAN THE BOTTOM OF THE SHOULDER'S AGGREGATE BASE.

|                                                                                                                                                                                                                                                                      |                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                        |                                                                |
|  <p>STATE OF MISSOURI<br/>KATHRYN PHILLIPS HARVEY<br/>NUMBER PE-23751<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p><b>PAVEMENT UNDERDRAINAGE<br/>AGGREGATE UNDERDRAINS</b></p> |
| <p>DATE EFFECTIVE: 06/01/2013<br/>DATE PREPARED: 4/1/2013</p>                                                                                                                                                                                                        | <p><b>605.101</b></p>                                          |
| <p>SHEET NO.<br/>4 OF 4</p>                                                                                                                                                                                                                                          |                                                                |



STEEL POST & WOOD OR PLASTIC BLOCK

TYPE A GUARDRAIL

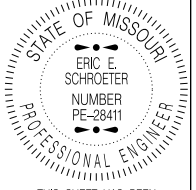


STEEL POST & WOOD OR PLASTIC BLOCKS

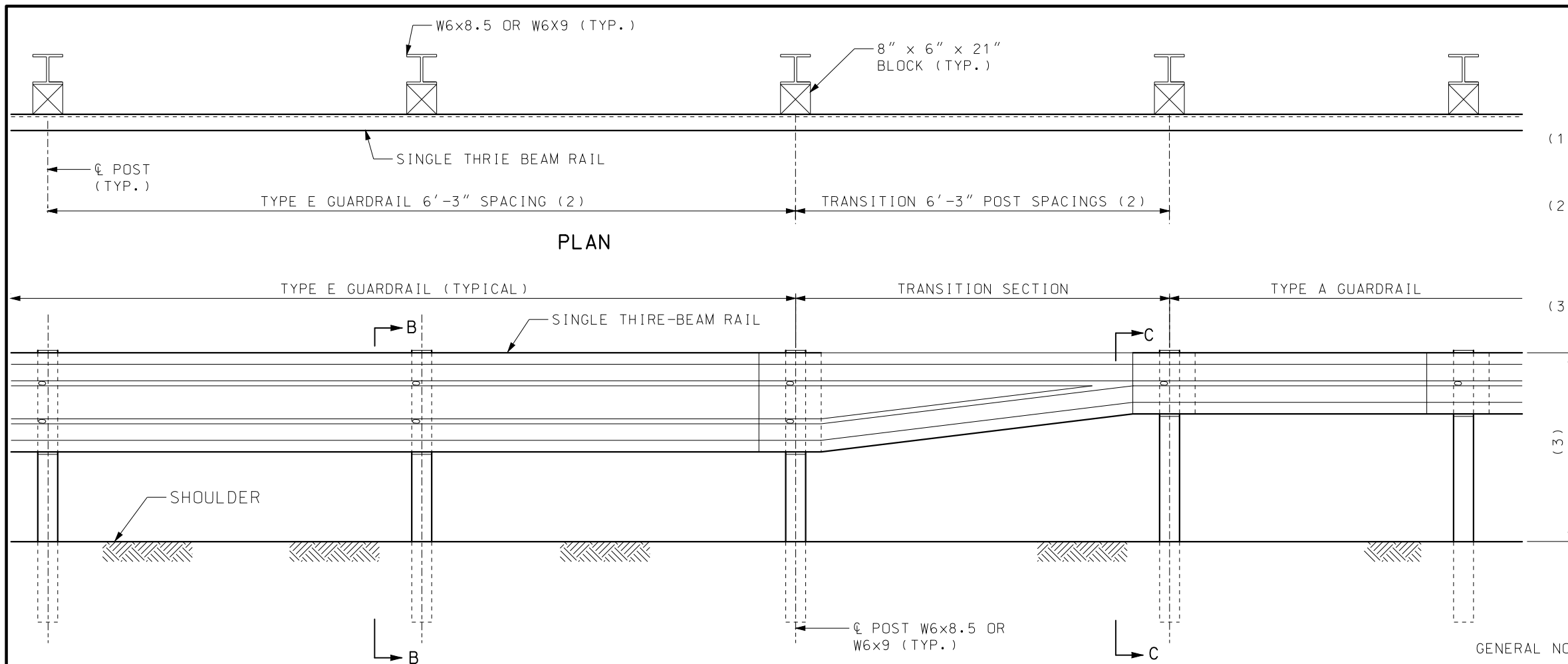
TYPE B GUARDRIAL

(1) THE CONTRACTOR MAY FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH SECTION 1040.

GENERAL NOTES:  
SEE SHEET NO. 5 OF 7 FOR POST AND BLOCK DETAILS.

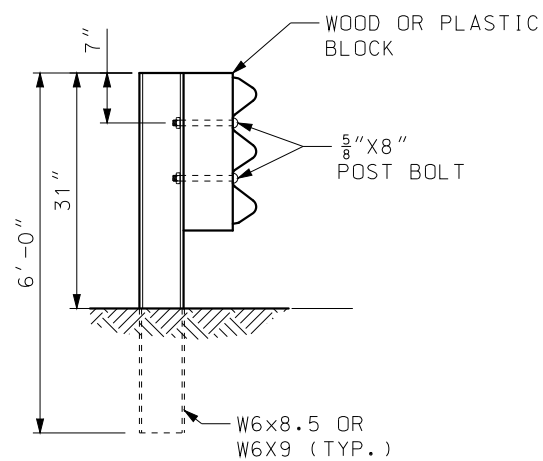
|                                                                                                                                                                                                                                  |                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                        |
|                                                                                                                                             | <b>GUARDRAIL<br/>TYPE A AND TYPE B</b> |
| DATE EFFECTIVE: 01/01/2017<br>DATE PREPARED: 10/28/2016                                                                                                                                                                          | 606.00AY                               |
| SHEET NO.<br>1 OF 7                                                                                                                                                                                                              |                                        |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

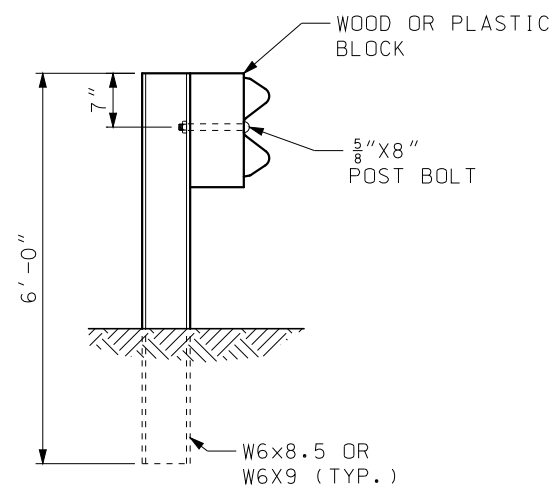


### PART SECTION SHOWING TYPE E TO TYPE A GUARDRAIL TRANSITION

THE OVERALL NOMINAL DIMENSIONS SHOWN SHALL BE MET, ALTHOUGH THE SHAPE OF THE PLASTIC BLOCKS MAY VARY FROM THE SHAPE SHOWN, EXCEPT THE  $\frac{7}{8}$ "  $\pm$   $\frac{1}{4}$ " FLANGE AND THE OVERALL WIDTH DIMENSIONS MAY BE WAIVED IF APPROVED BY PROJECT OPERATIONS.



SECTION B-B



SECTION C-C

- (1) THE CONTRACTOR MAY FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH SEC 1040.
- (2) IF THE TRANSITION IS CONNECTED TO A BRIDGE ANCHOR SECTION, POST SPACING FOR TYPE E GUARDRAIL AND THE TRANSITION SECTION SHALL BE 3'-1 1/2". FOR ALL OTHER CASES, POST SPACING SHALL BE 6'-3".
- (3) TRANSITION FROM 31" TO 29" HEIGHT OVER 2-12.5' W-BEAMS OR 25'.

#### GENERAL NOTES:

TYPE E GUARDRAIL SHALL USE 6'-3" POST SPACING UNLESS 3'-1 1/2" POST IS SPECIFIED.

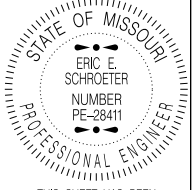
THE THRIE BEAM RAIL FOR THE TYPE E GUARDRAIL AND THE TRANSITION SECTION SHALL BE MADE OF STEEL AND SHALL BE 12 GAGE.

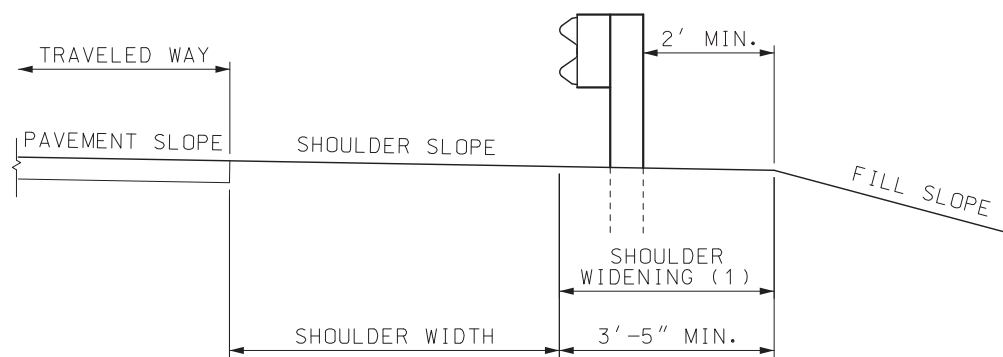
FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SEC 1040 OF THE STANDARD SPECIFICATIONS.

SEE SHEET 7 OF 7 FOR REQUIREMENTS FOR SPECIAL INSTALLATIONS.

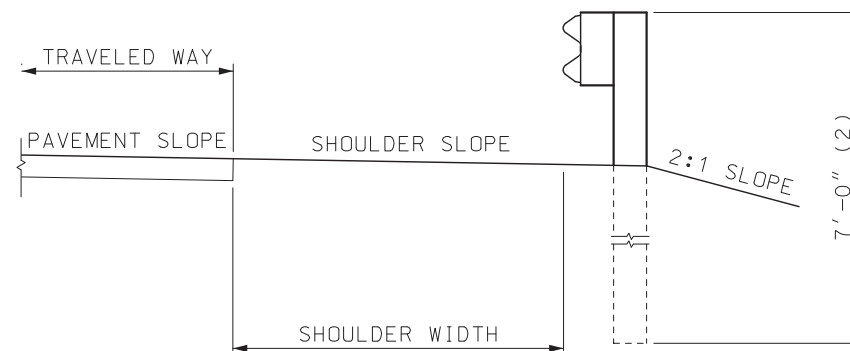
ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE SHOWN.

FOR DETAILS NOT SHOWN, SEE OTHER SHEETS OF THIS DRAWING.

|                                                                                                                                                                                                                                  |                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                     |
|                                                                                                                                             | <b>GUARDRAIL TYPE E</b>             |
| DATE EFFECTIVE: 01/01/2017<br>DATE PREPARED: 10/28/2016                                                                                                                                                                          | SHEET NO.<br><b>606.00AY 2 OF 7</b> |

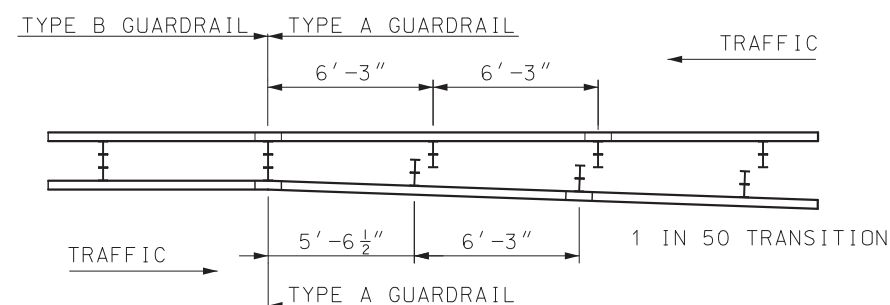


TYPICAL SECTION

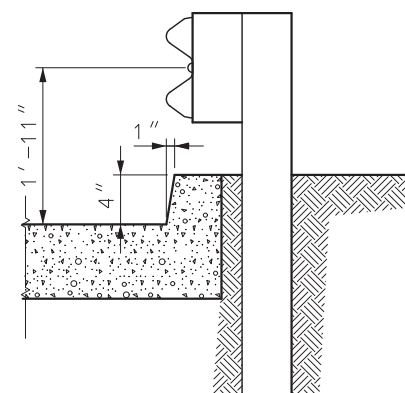
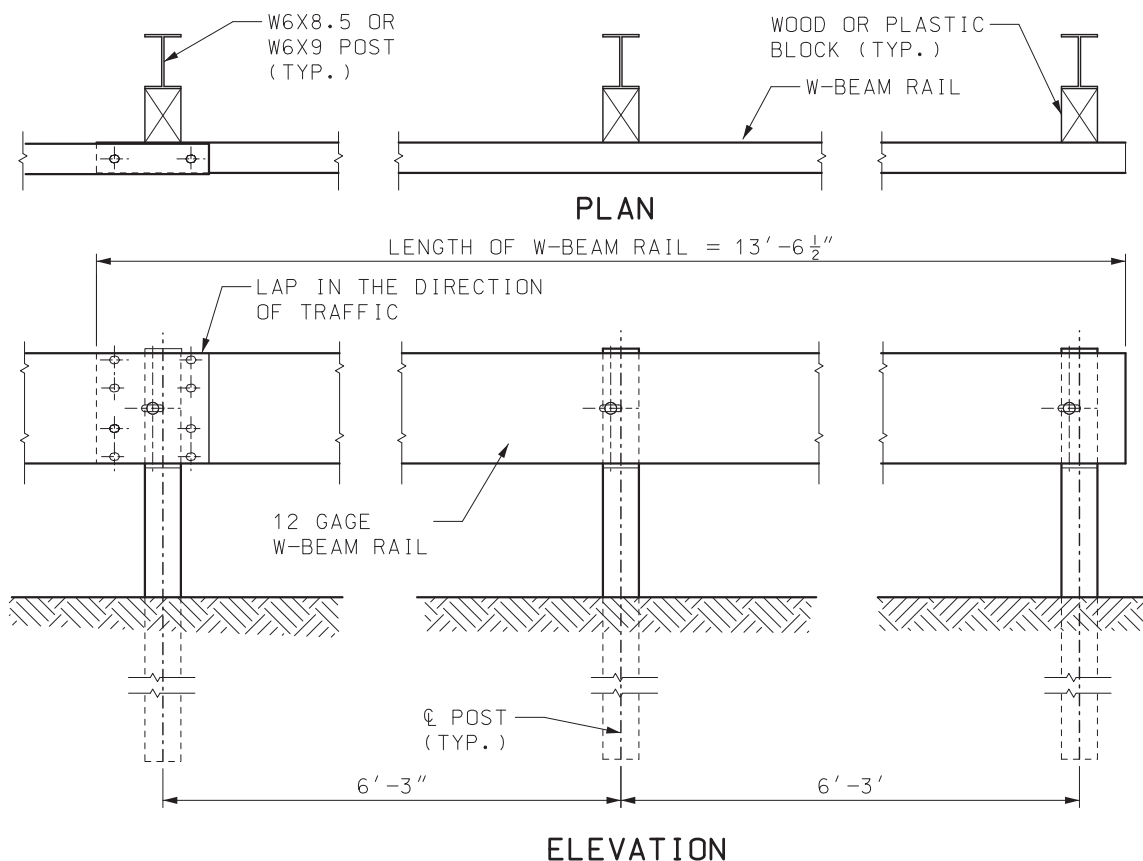


ALTERNATE TYPICAL SECTION AT SLOPE BREAKPOINT

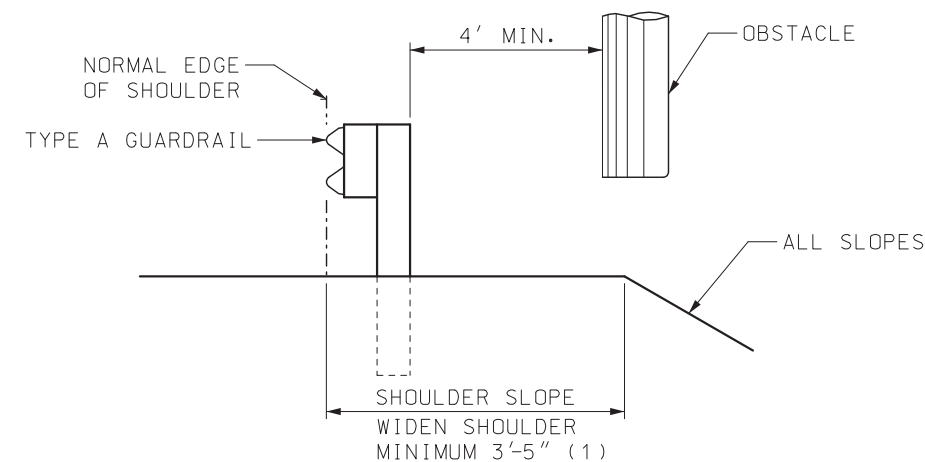
- (1) SHOULDER WIDENING SHALL CONSIST OF EMBANKMENT MATERIAL COMPACTED IN ACCORDANCE WITH SEC 203.4 OF THE STANDARD SPECIFICATIONS.
- (2) POST SHALL BE SPACED AT 3'-1 1/2" ON CENTER.
- (3) WHEN GUARDRAIL IS CONSTRUCTED OVER CURBS, THE CURBS SHALL BE CONSTRUCTED AS SHOWN.



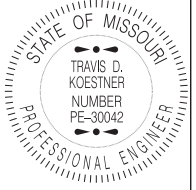
DETAIL FOR TRANSITIONING  
BETWEEN TYPE A AND TYPE B GUARDRAIL

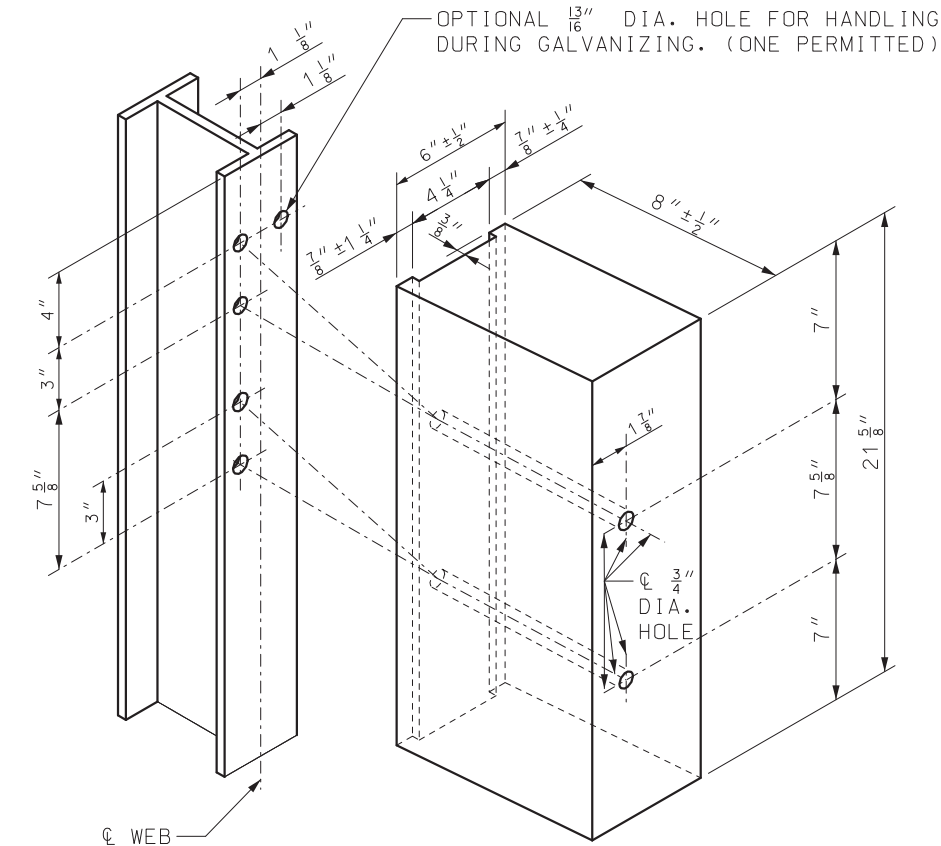


GUARDRAIL AT CURBS (3)

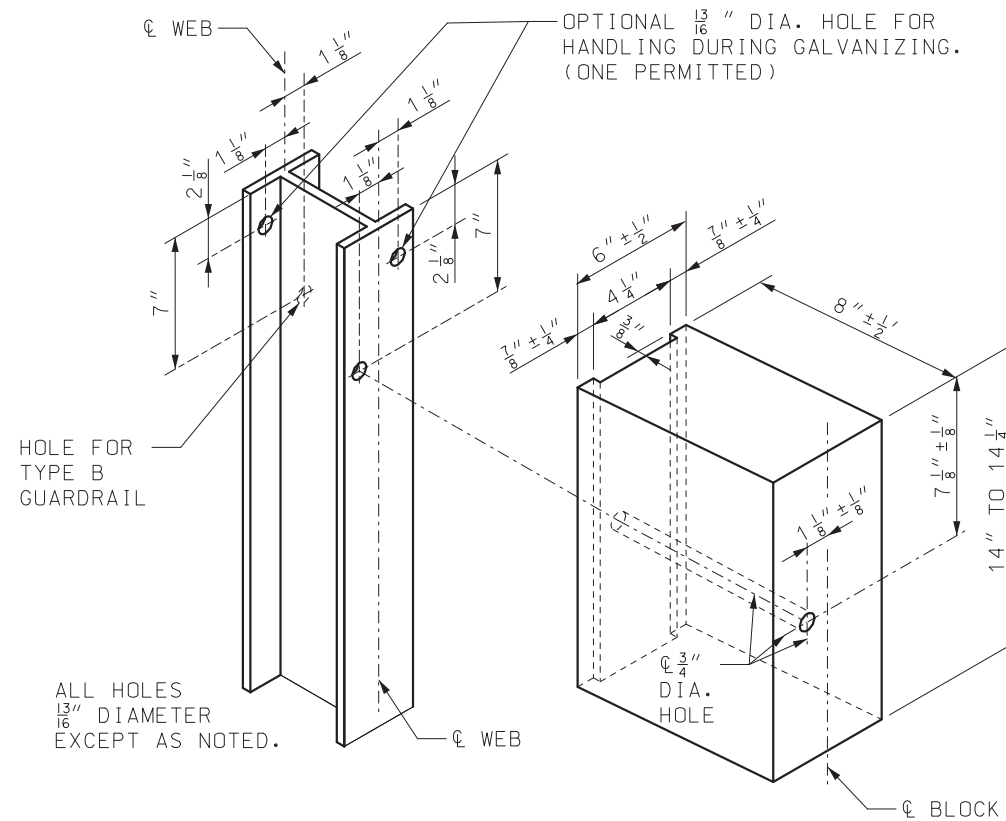


LOCATION OTHER THAN  $\phi$  MEDIAN  
LATERAL PLACEMENT OF GUARDRAIL  
FOR SHOULDER INSTALLATION

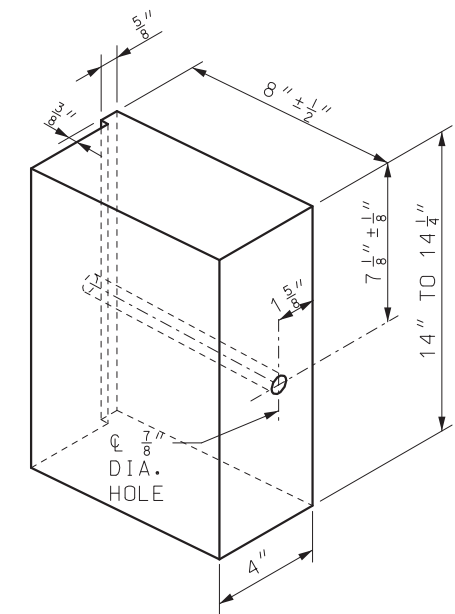
|                                                                                                                                                                                                                                  |                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                         |
|                                                                                                                                             | <b>GUARDRAIL LAYOUT</b> |
| DATE EFFECTIVE: 01/01/2020<br>DATE PREPARED: 10/21/2019                                                                                                                                                                          | 606.00AY                |
| SHEET NO.<br><b>3 OF 7</b>                                                                                                                                                                                                       |                         |



TYPE E  
FOR STEEL POST & WOOD OR PLASTIC BLOCKS (1)

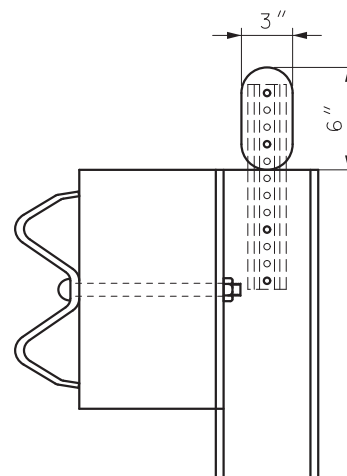
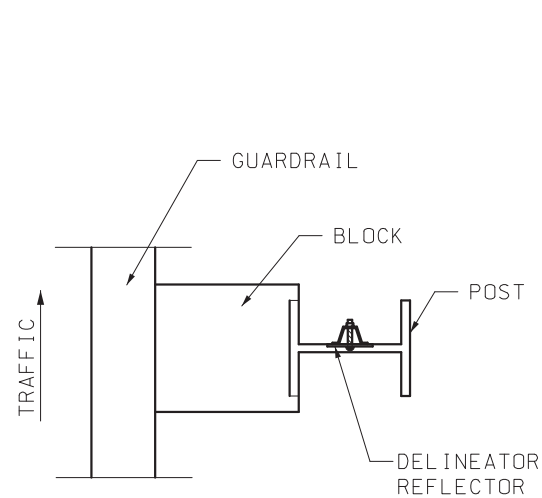


TYPE A AND TYPE B  
FOR STEEL POST AND WOOD OR PLASTIC BLOCKS (1)

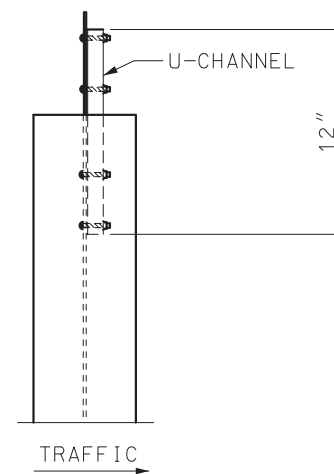


ALTERNATE DESIGN  
FOR WOOD BLOCK

(1) THE OVERALL NOMINAL DIMENSIONS SHOWN SHALL BE MET, ALTHOUGH THE SHAPE OF THE PLASTIC BLOCKS MAY VARY FROM THE SHAPE SHOWN, EXCEPT THE  $\frac{1}{8}$ "  $\pm \frac{1}{4}$ " FLANGE AND THE OVERALL WIDTH DIMENSIONS MAY BE WAIVED IF APPROVED BY PROJECT OPERATIONS.

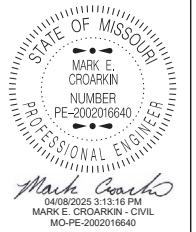


DELINEATORS ON NEW GUARDRAIL

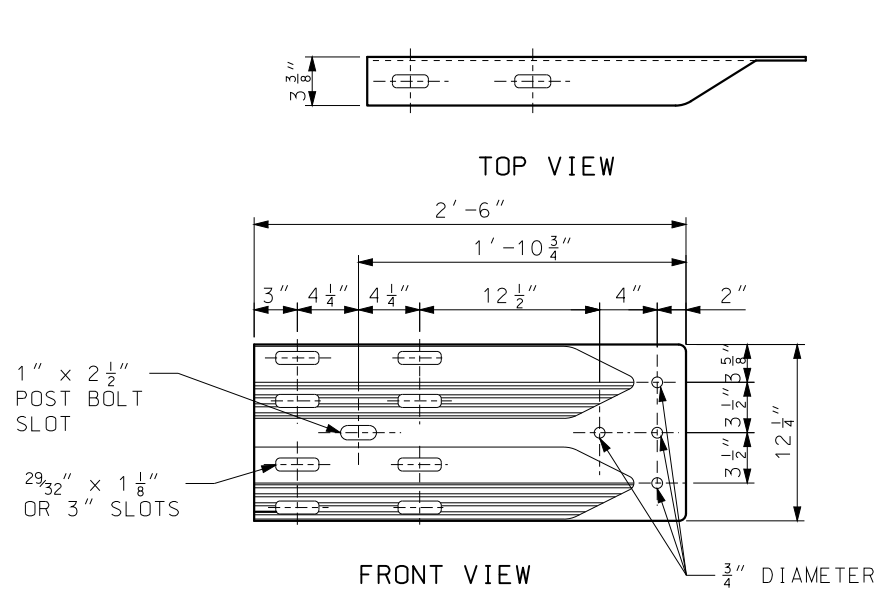


GENERAL NOTES:

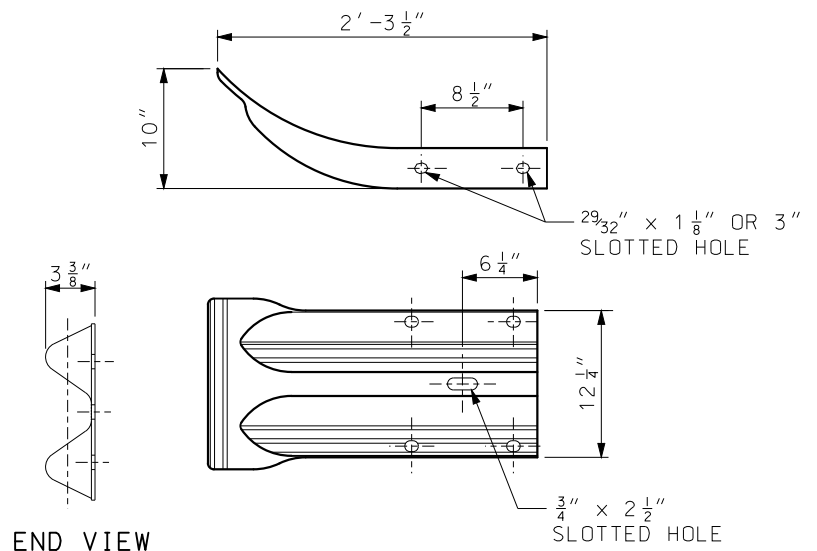
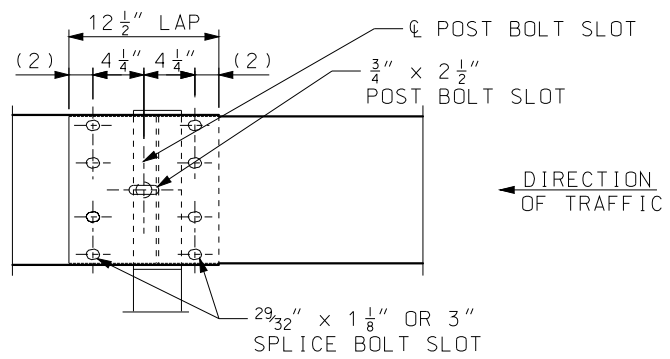
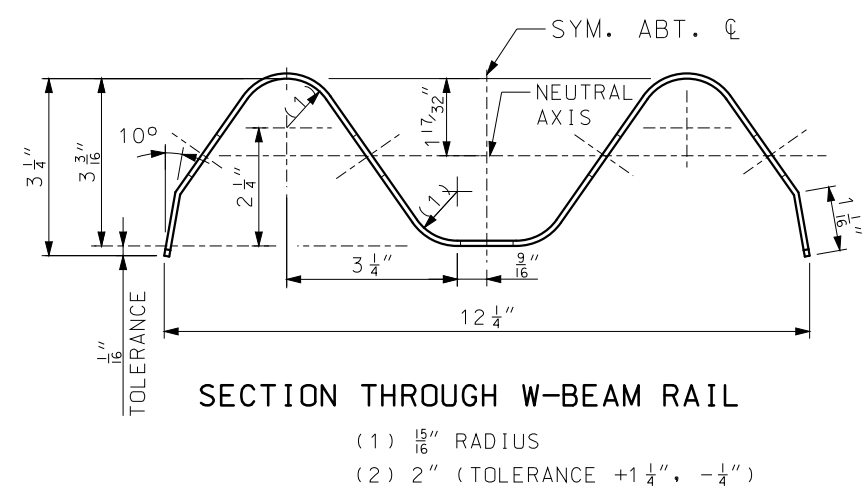
FOR GUARDRAIL DELINEATION DETAILS,  
SEE STD PLAN 903.00.

|                                                                                                                                                                                                                                  |                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                        |
|                                                                                                                                             | <b>GUARDRAIL POST AND BLOCK</b>        |
| DATE EFFECTIVE: 07/01/2025<br>DATE PREPARED: 3/26/2025                                                                                                                                                                           | SHEET NO.<br><b>606.00AY</b><br>4 OF 7 |

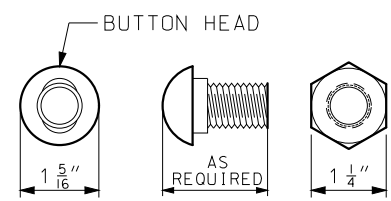
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



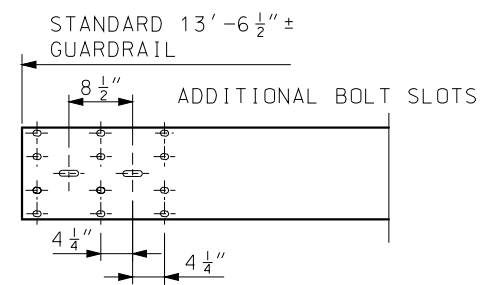
TERMIANL CONNECTOR



THRIE-BEAM SPLICE AT POST

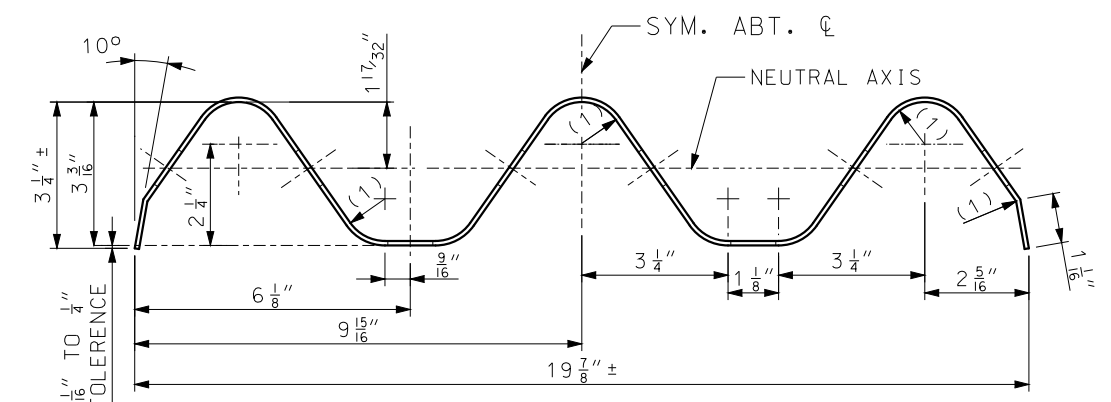


OVAL SHOULDER SHALL BE OF ADEQUATE HEIGHT, LENGTH & SHAPE TO PREVENT TURNING DURING INSTALLATION OR REMOVAL OF BOLT.

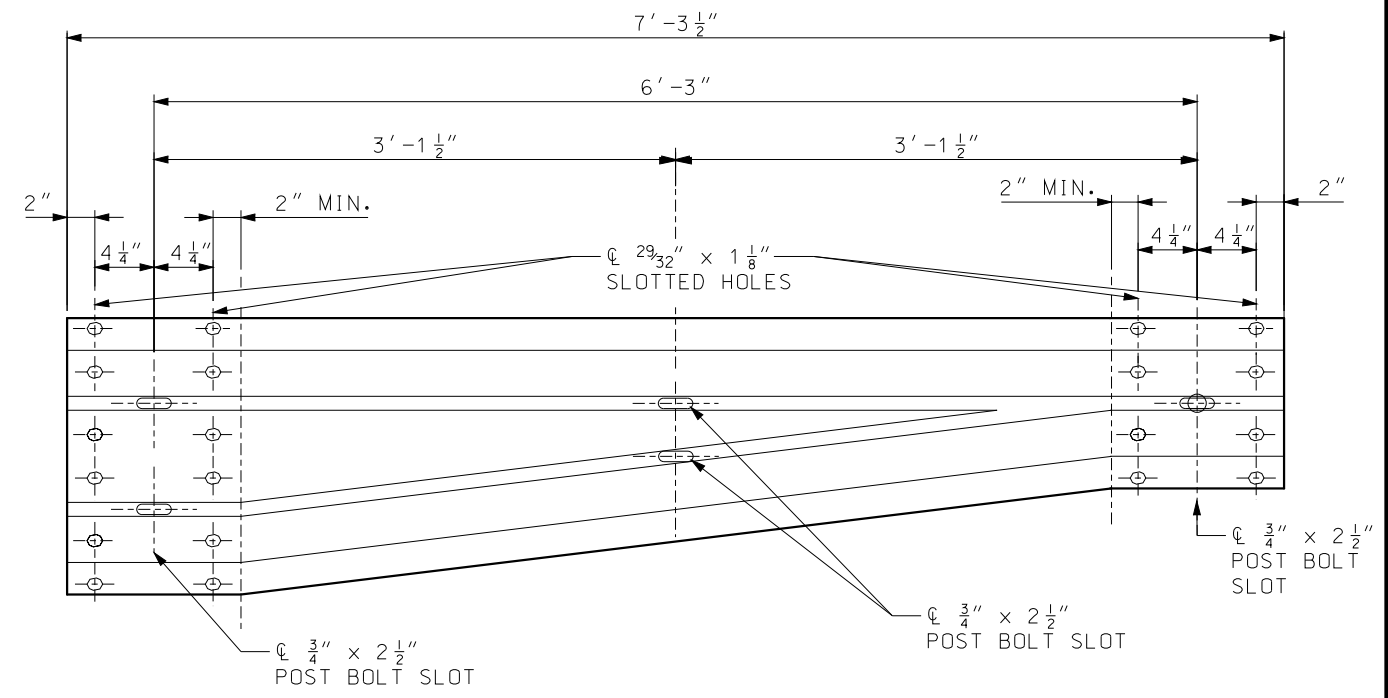


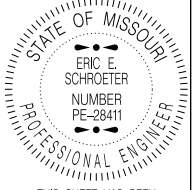
NOTE: PORTIONS OF BEAM WITH UNUSED BOLT SLOTS TO BE LAPPED BEHIND.

BEAM DETAILS SHOWING LOCATION OF ADDITIONAL BOLT SLOTS NECESSARY TO OBTAIN GUARDRAIL OFFSET.

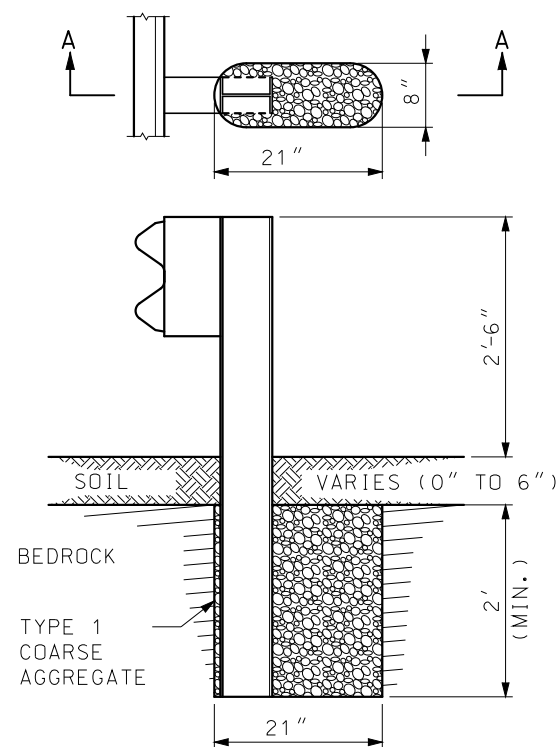


SECTION THROUGH THRIE BEAM RAIL

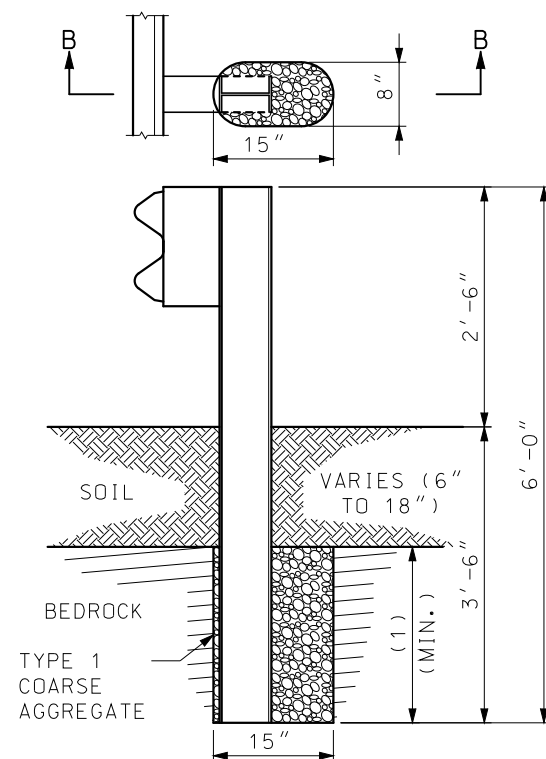


|                                                                                                                                              |                                                         |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                                         |                  |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                                         |                  |
|                                                         | <b>GUARDRAIL RAIL ELEMENTS</b>                          |                  |
|                                                                                                                                              | DATE EFFECTIVE: 01/01/2017<br>DATE PREPARED: 10/28/2016 | SHEET NO. 5 OF 7 |

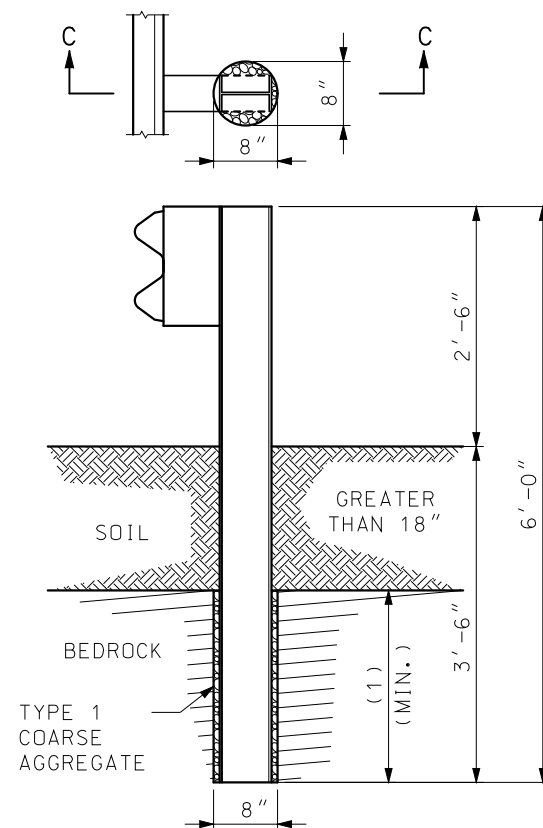




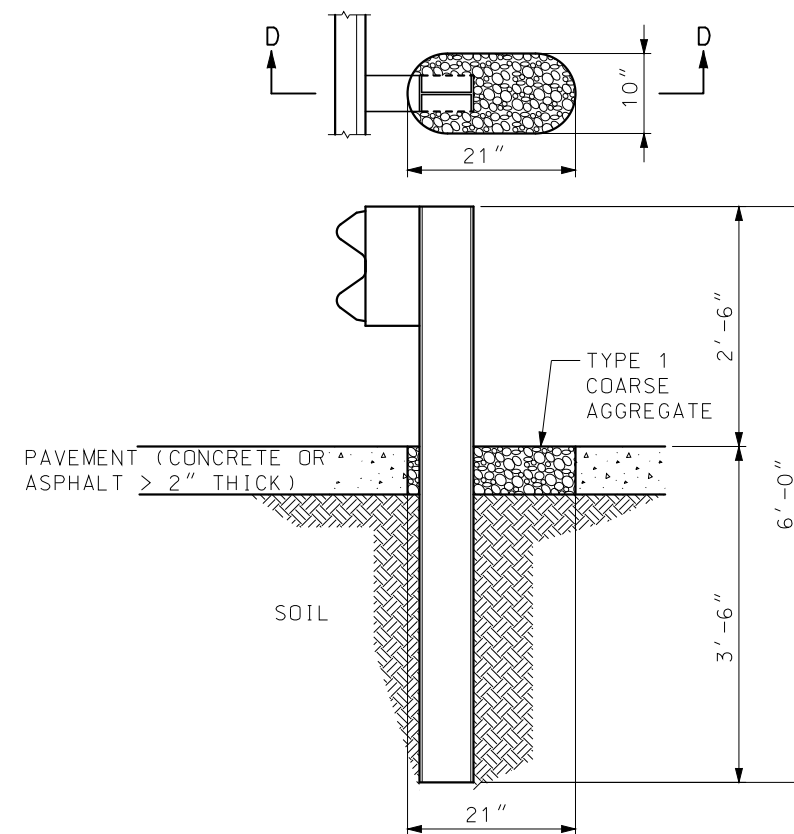
SECTION A-A  
ROCK ENCOUNTERED  
UP TO 6" BENEATH SURFACE



SECTION B-B  
ROCK ENCOUNTERED  
6" TO 18" BENEATH SURFACE



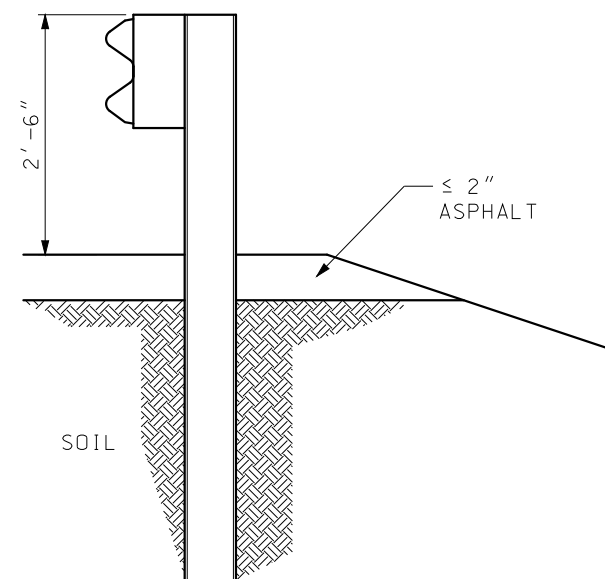
SECTION C-C  
ROCK ENCOUNTERED MORE  
THAN 18" BENEATH SURFACE



SECTION D-D  
SETTING POST THROUGH PAVEMENT  
(CONCRETE OR ASPHALT > 2" THICK)

#### SETTING POST IN SOLID ROCK

(1) MINIMUM ROCK EMBEDMENT IS EQUAL TO  
FULL DEPTH POST EMBEDMENT MINUS SOIL  
DEPTH.

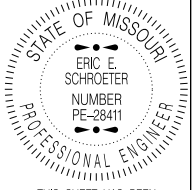


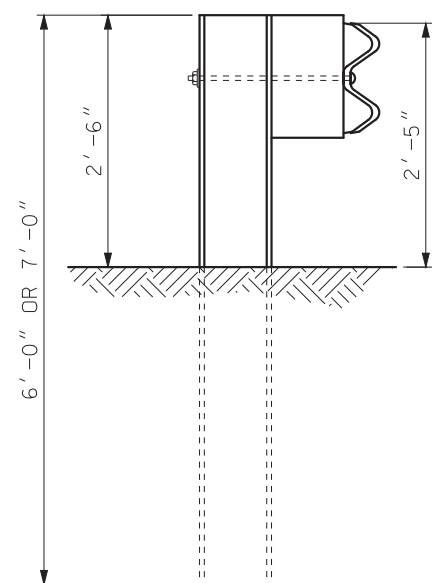
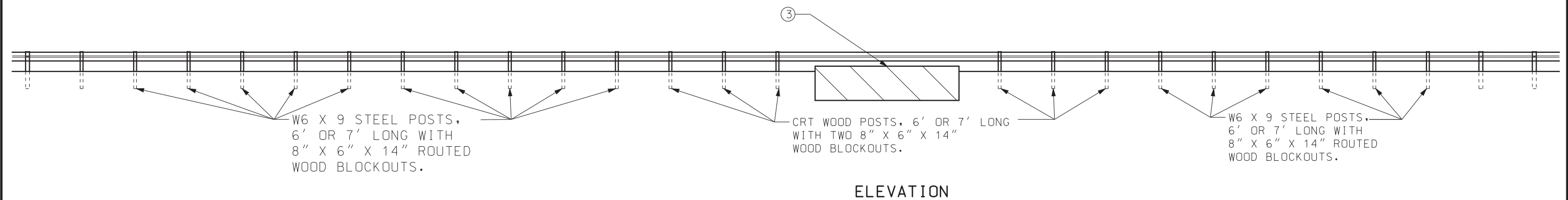
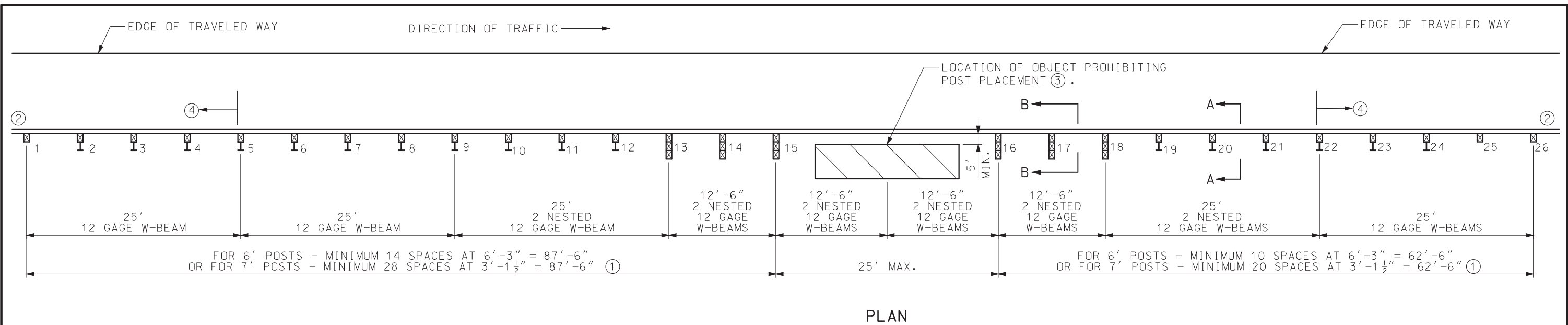
SETTING POST THROUGH ASPHALT  $\leq$  2" THICK

#### GENERAL NOTES:

HOLES IN SOLID ROCK SHALL PROVIDE A DIAMETER OF NOT  
LESS THAN 4 INCHES GREATER THAN THE MAXIMUM  
TRANSVERSE DIMENSION OF THE POST SECTION.

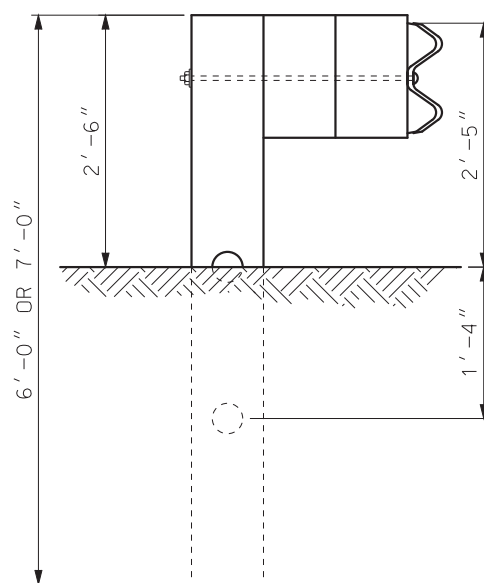
POST MAY BE SHORTER WHERE PLACED IN A MINIMUM 2 FEET  
OF SOLID ROCK. STEEL POSTS MAY BE FLAME OR SAW CUT.  
REPAIR OF CUT SHALL BE IN ACCORDANCE WITH SEC 712 OF  
THE STANDARD SPECIFICATIONS.

|                                                                                                                                                                                                                                  |                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                  |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <p align="center"><b>GUARDRAIL<br/>SPECIAL INSTALLATIONS</b></p> |
| DATE EFFECTIVE: 01/01/2017<br>DATE PREPARED: 10/28/2016                                                                                                                                                                          | 606.00AY                                                         |
| SHEET NO.<br>6 OF 7                                                                                                                                                                                                              |                                                                  |



SECTION A-A

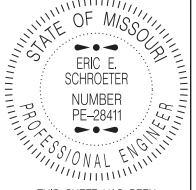
W6 X 9 STEEL POSTS, 6' OR 7' LONG WITH 8" X 6" X 14" ROUTED WOOD BLOCKOUTS POSTS 3 THROUGH 12 AND 19 THROUGH 24.

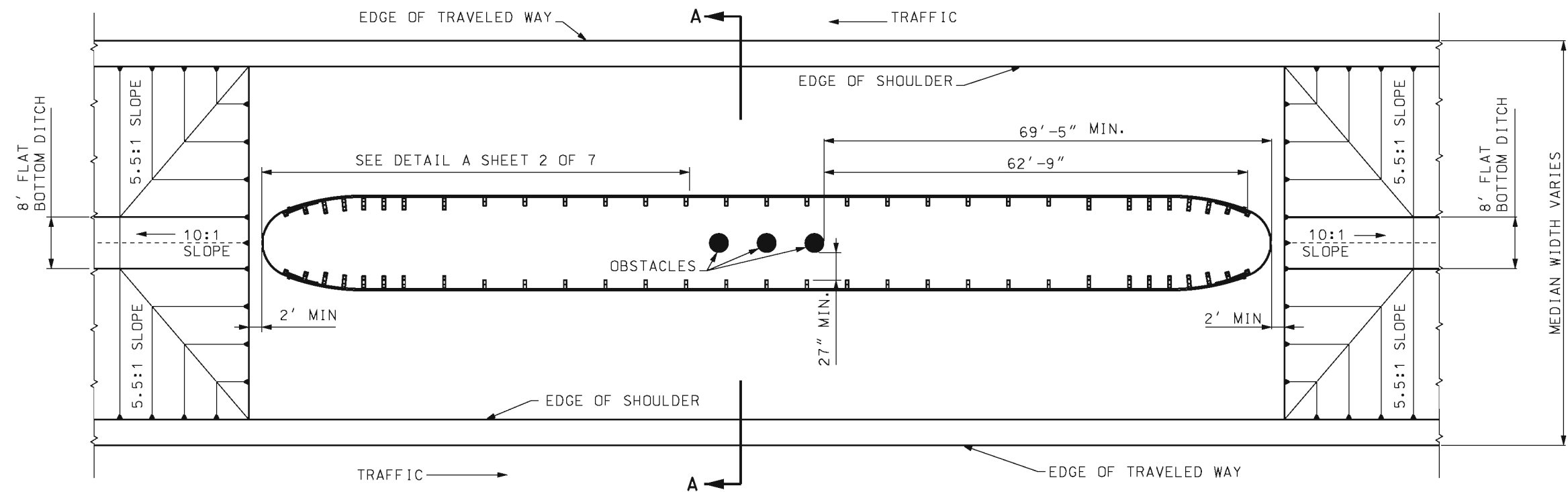


SECTION B-B

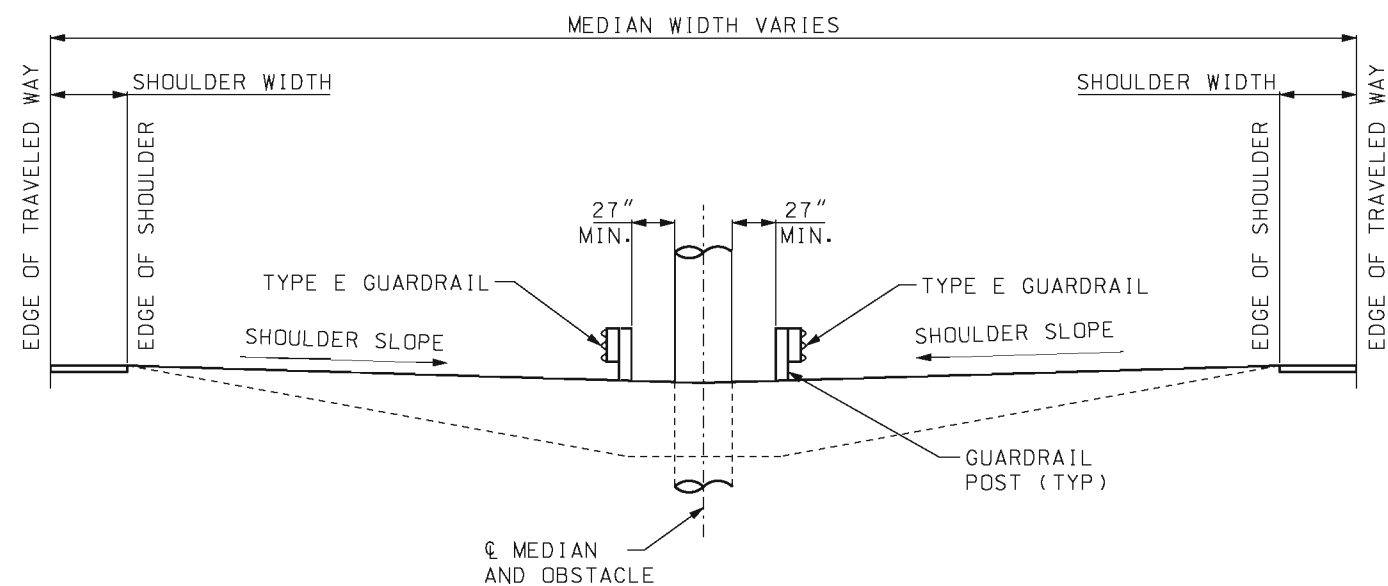
CRT WOOD POSTS, 6' OR 7' LONG WITH TWO 8" X 6" X 14" WOOD BLOCKOUTS POSTS 13 THROUGH 18.

- ① IF LOCATED WITHIN THE CLEAR ZONE OF A TWO-WAY ROADWAY, THE MINIMUM LENGTH IS 87'-6".
- ② ADDITIONAL GUARDRAIL AS REQUIRED, INCLUDING END TREATMENT.
- ③ THE POST MAY BE SKIPPED DUE TO THE PRESENCE OF AN OBSTACLE SUCH AS A CULVERT.
- ④ PLACE END TREATMENT NO CLOSER TO THE SKIPPED POST THAN POSTS 5 AND 22.

|                                                                                                                                                                                                                                  |                                              |                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                              |                            |
|                                                                                                                                             | <b>GUARDRAIL<br/>LONG-SPAN NESTED W-BEAM</b> |                            |
| DATE EFFECTIVE: 10/01/2017<br>DATE PREPARED: 8/8/2017                                                                                                                                                                            | <b>606.00AY</b>                              | SHEET NO.<br><b>7 OF 7</b> |



PIER AT C OF MEDIAN  
PLAN VIEW



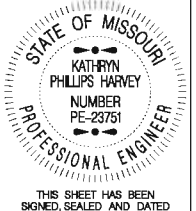
SECTION A-A

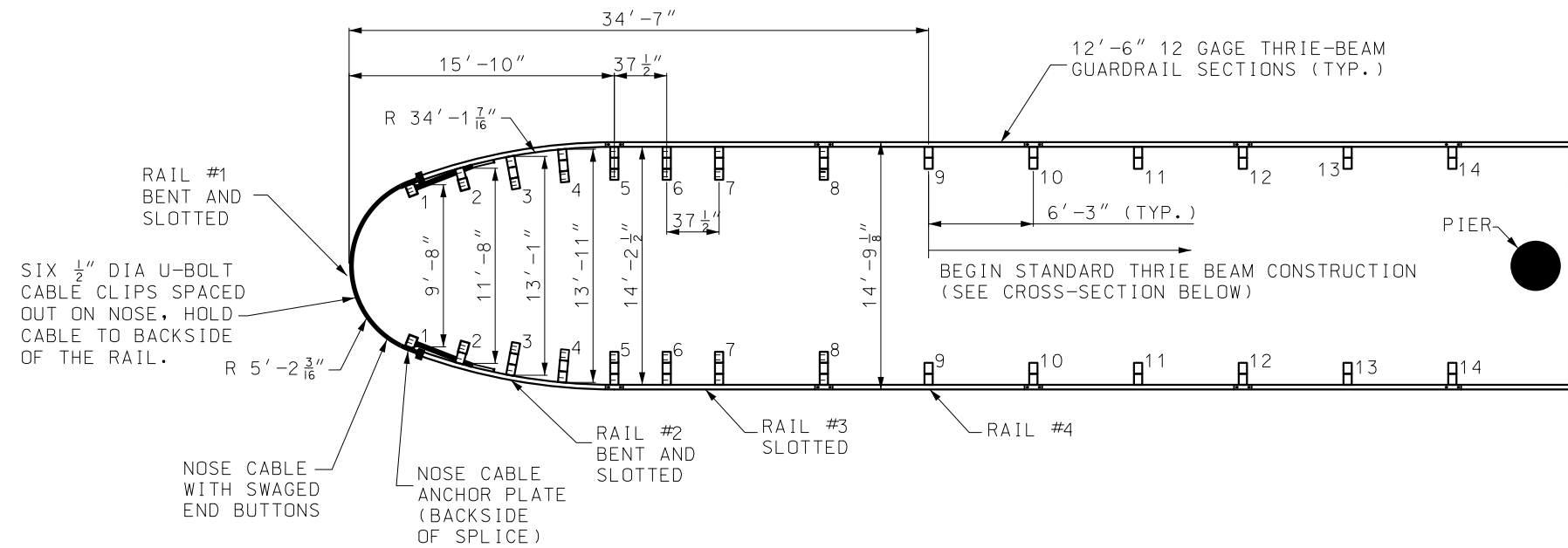
GENERAL NOTES:

WOOD POSTS AND WOOD BLOCKS MAY BE USED ON TYPE E GUARDRAIL.

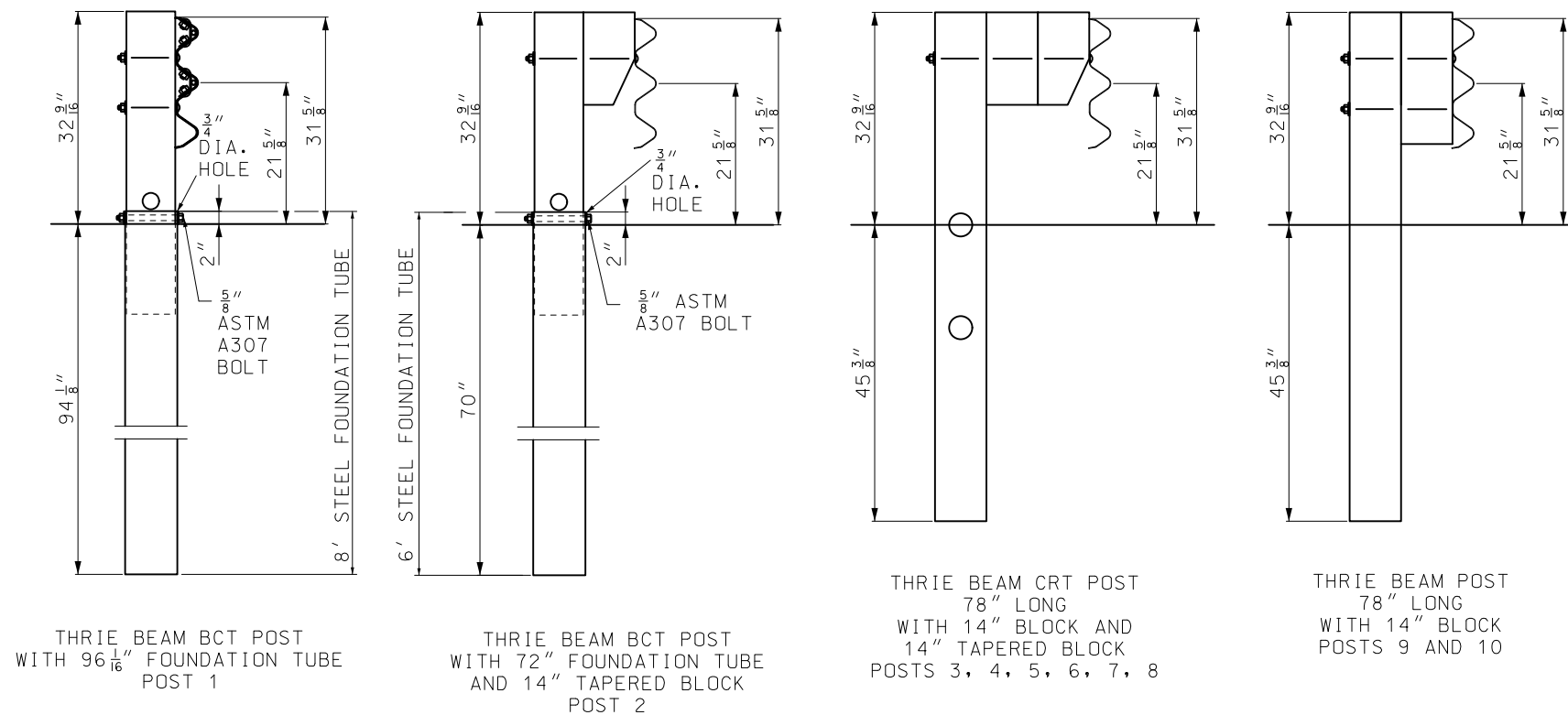
THE BULLNOSE GUARDRAIL PAY ITEM INCLUDES THE STRUCTURE BETWEEN POST 10 AND THE NOSE. THE REMAINING GUARDRAIL WILL BE PAID FOR AS STANDARD GUARDRAIL ITEMS.

SUITABLE DRAINAGE MUST BE PROVIDED WHEN MEDIAN GRADING IMPEDES NORMAL FLOW.

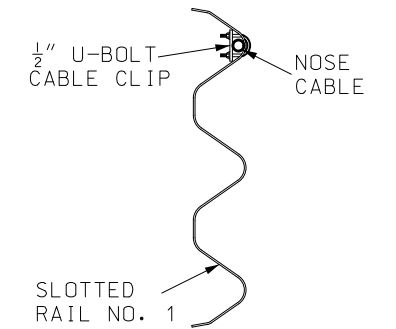
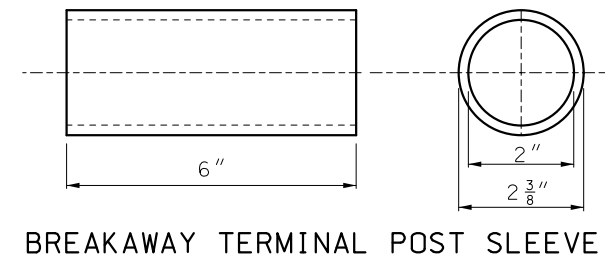
|                                                                                                                                                                                                                                  |                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                   |
|                                                                                                                                             | <b>MEDIAN PIER PROTECTION</b><br><b>BULLNOSE GUARDRAIL SYSTEM</b> |
| DATE EFFECTIVE: 08/01/2012<br>DATE PREPARED: 7/27/2012                                                                                                                                                                           | <b>606.01F</b>                                                    |
| SHEET NO.<br>1 OF 9                                                                                                                                                                                                              |                                                                   |



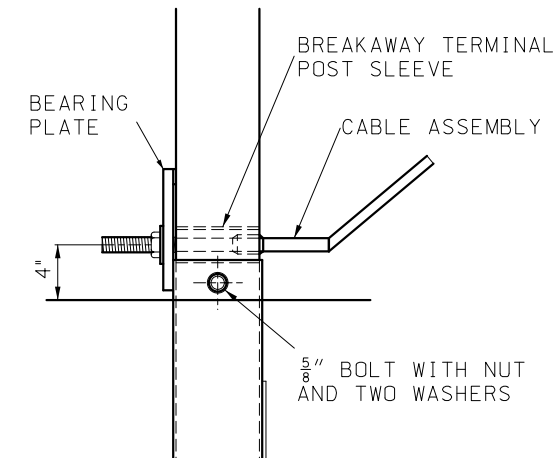
DETAIL A



POST DETAILS



U-BOLT CABLE CLIP DETAIL

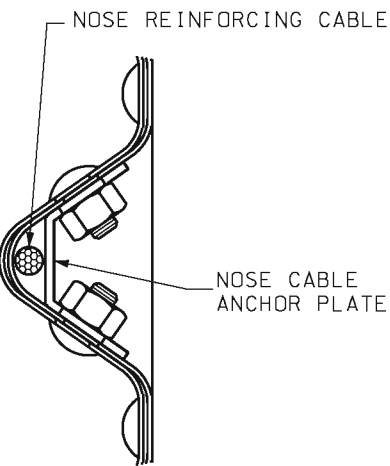


POST 1 DETAIL

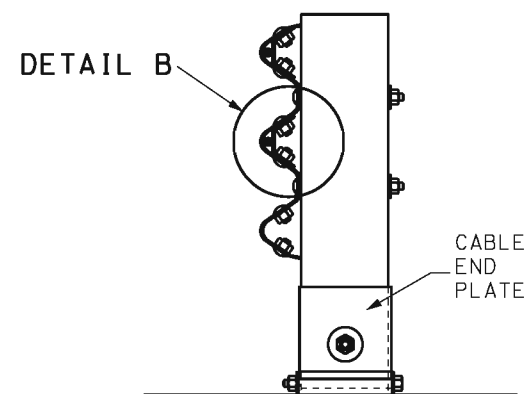
GENERAL NOTE:

RAILS NUMBERS 1, 2, 3 AND 4 ARE TYPE E GUARDRAIL.  
RAIL NUMBER 4 IS A STANDARD THRIE BEAM, NOT SLOTTED.

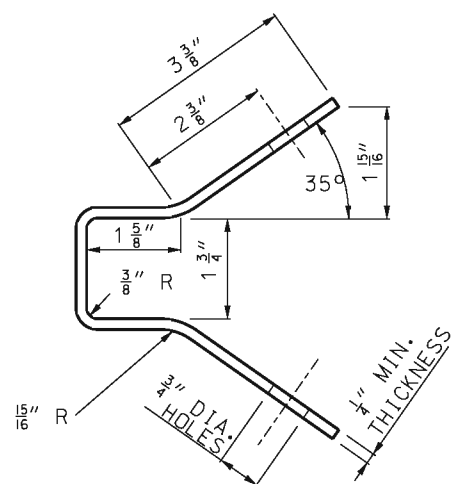
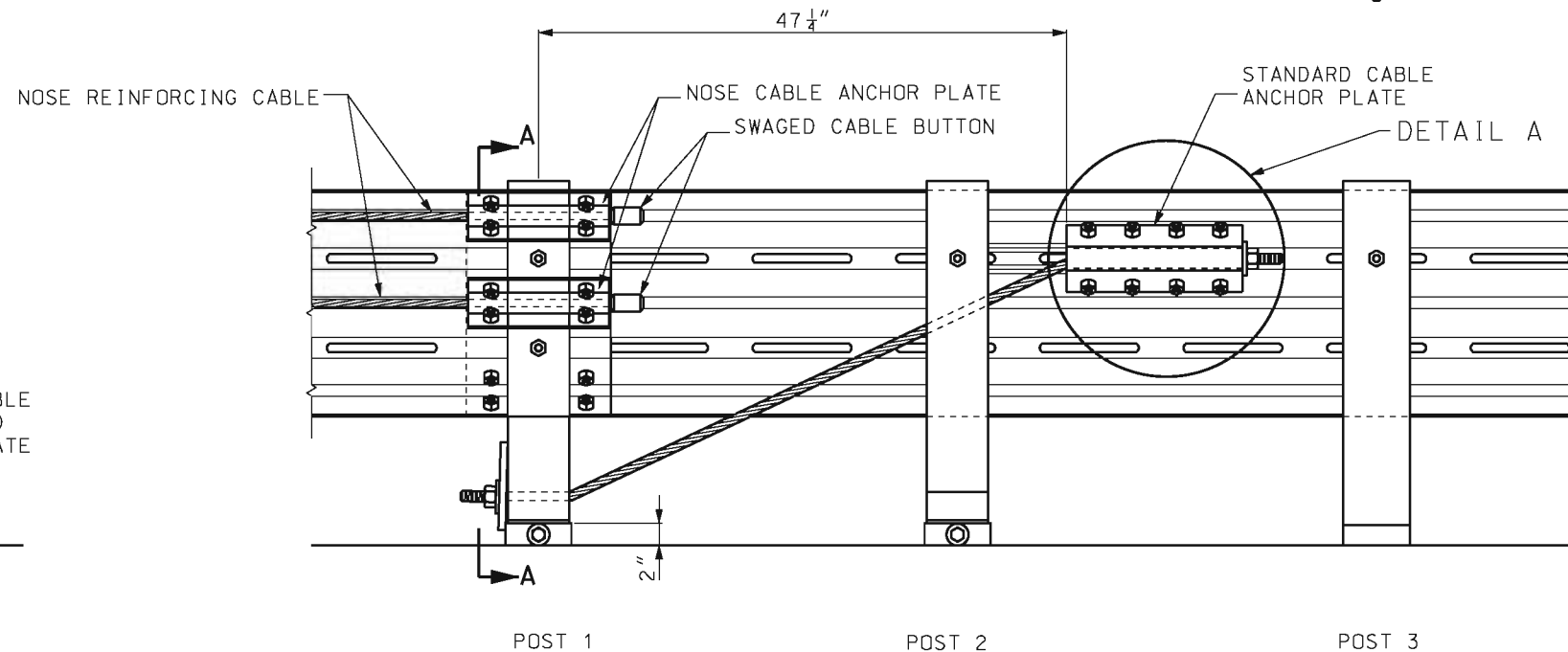
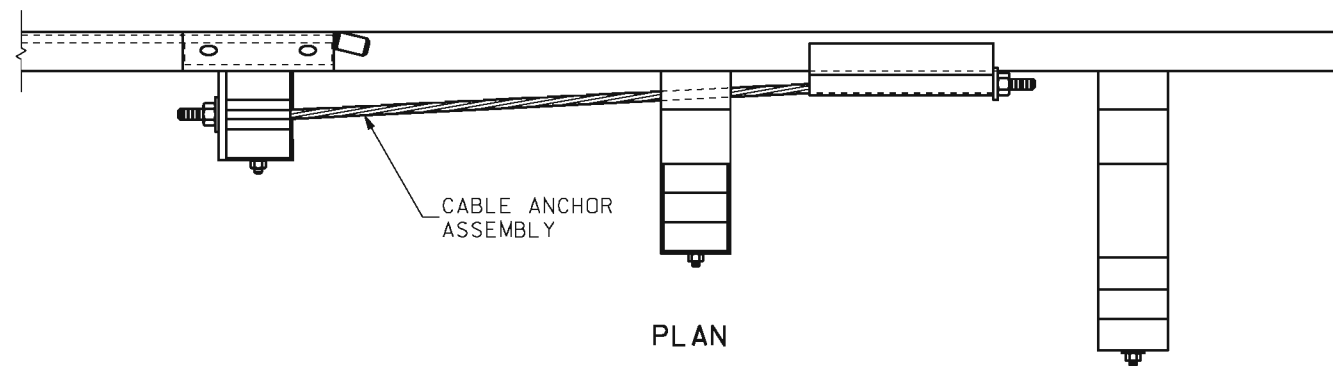
|                                                                                                                                                         |                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                              |
| <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                                     | <p><b>MEDIAN PIER PROTECTION</b></p> <p><b>BULLNOSE GUARDRAIL SYSTEM</b></p> |
| <p>DATE EFFECTIVE: 04/01/2021</p> <p>DATE PREPARED: 1/27/2021</p>                                                                                       | <p><b>606.01F</b></p> <p>SHEET NO.<br/>2 OF 9</p>                            |



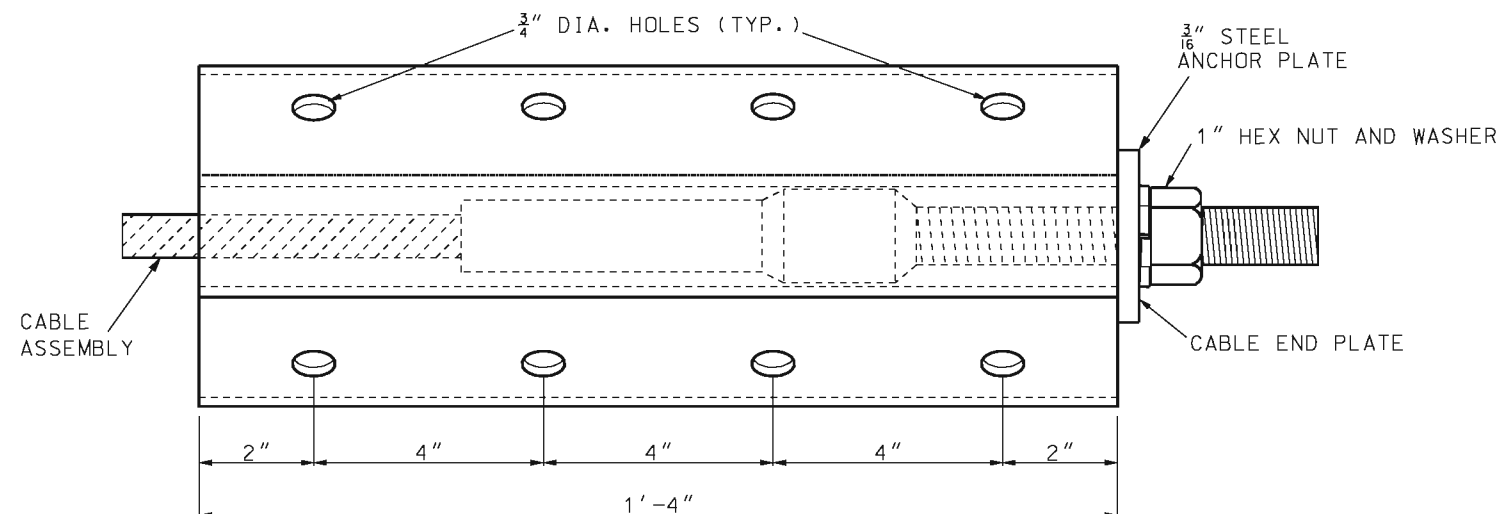
DETAIL B



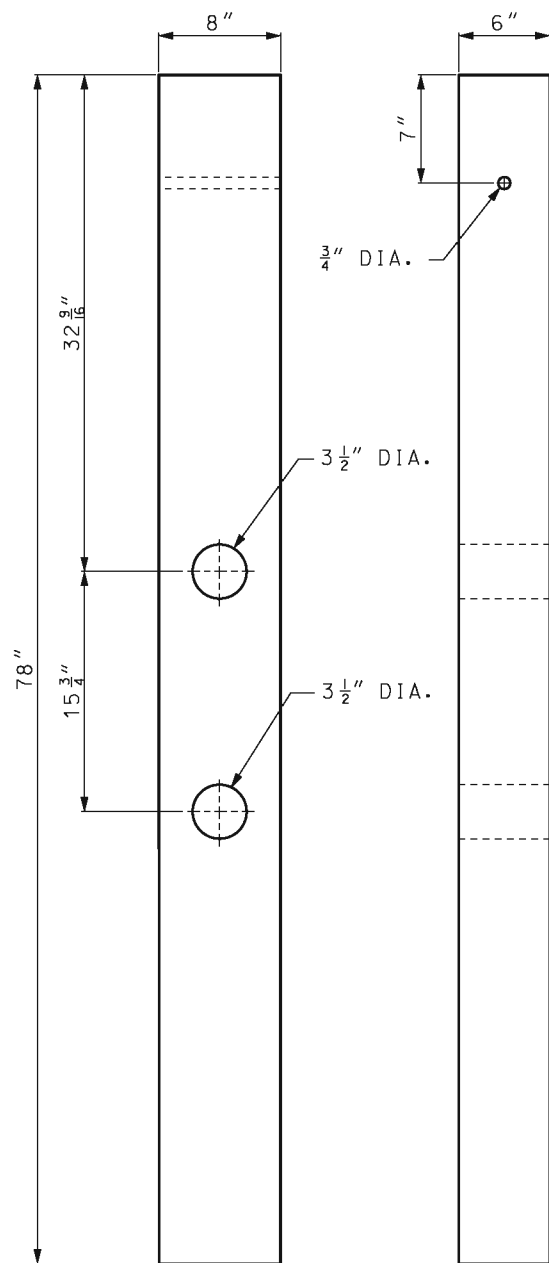
SECTION A-A



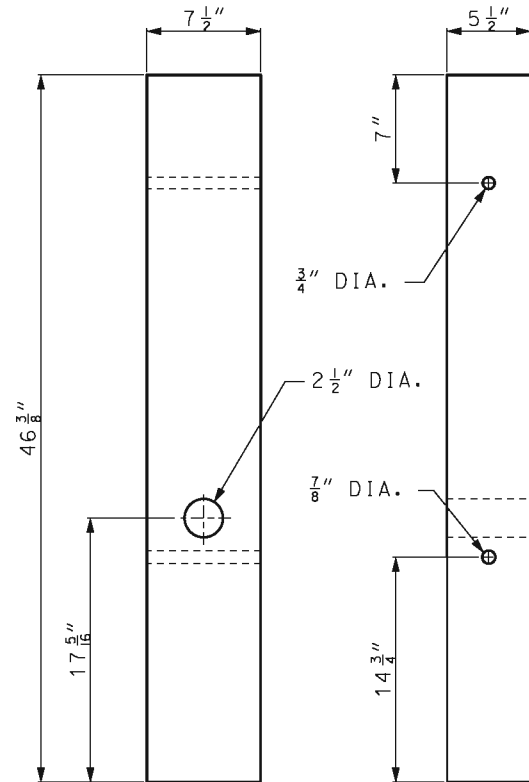
END VIEW



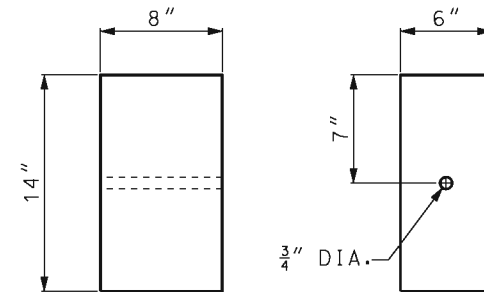
|                                                                                                                                                                                                                                  |                                                                                          |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                          |                |
| <br>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.                                                                            | <b>MEDIAN PIER PROTECTION</b><br><b>BULLNOSE GUARDRAIL SYSTEM</b><br><b>CABLE ANCHOR</b> |                |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 08/01/2012<br>DATE PREPARED: 7/27/2012                                   | <b>606.01F</b> |



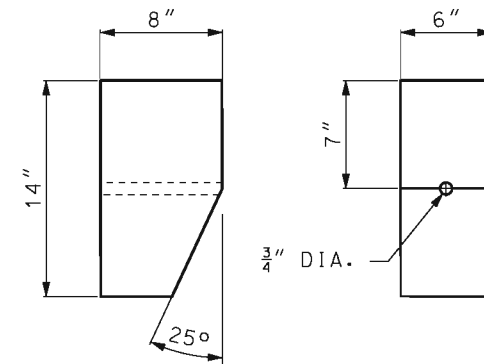
THRIE BEAM CRT POSTS



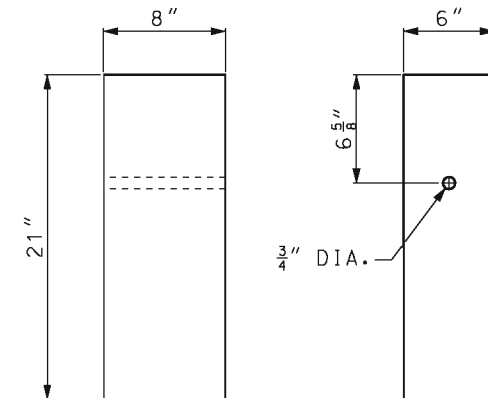
THRIE BEAM ANCHOR POSTS



POSTS 2 THROUGH 8  
STANDARD BLOCKS

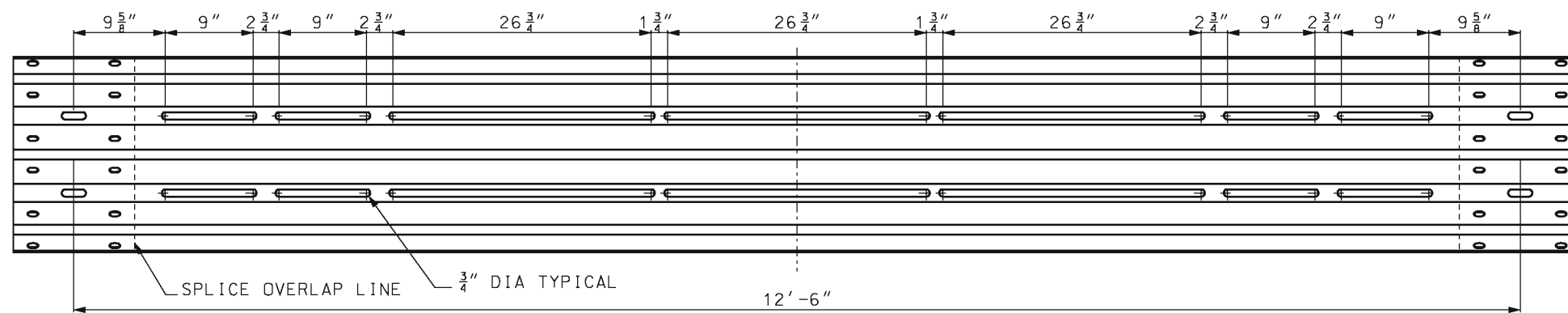


TAPERED BLOCK

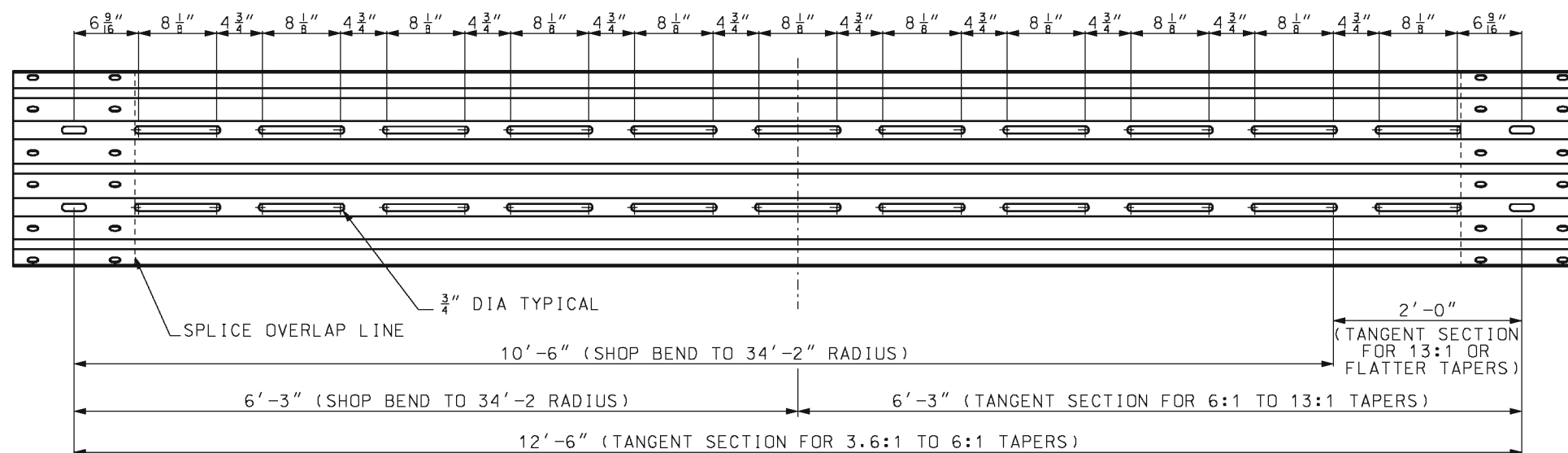


BLOCKS FOR POSTS 9 AND 10  
STANDARD BLOCKS

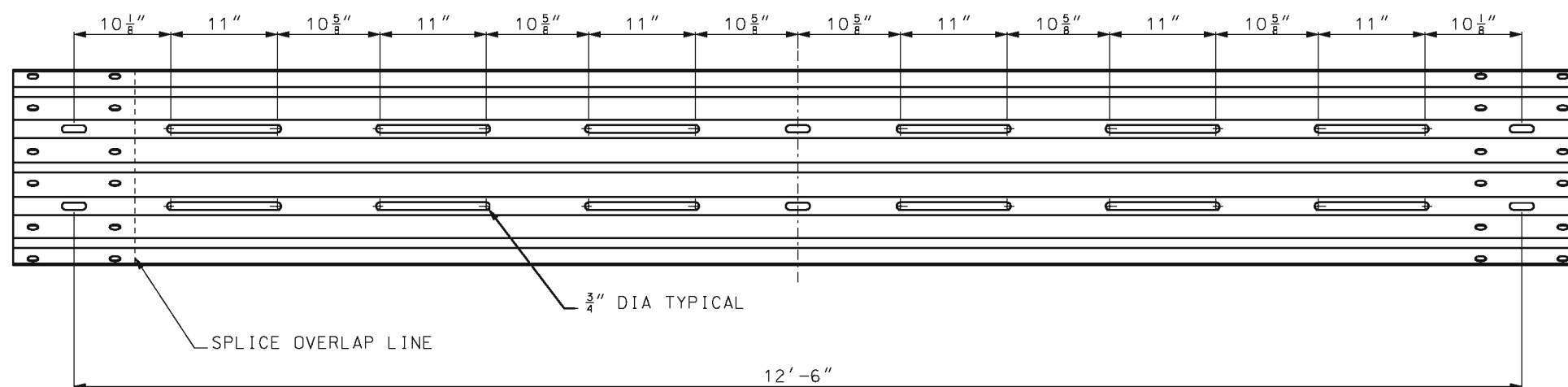
|                                                                                                                                                                                                                                  |                                                                                             |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                             |                     |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <b>MEDIAN PIER PROTECTION</b><br><b>BULLNOSE GUARDRAIL SYSTEM</b><br><b>POST AND BLOCKS</b> |                     |
| DATE EFFECTIVE: 08/01/2012<br>DATE PREPARED: 7/27/2012                                                                                                                                                                           | <b>606.01F</b>                                                                              | SHEET NO.<br>4 OF 9 |



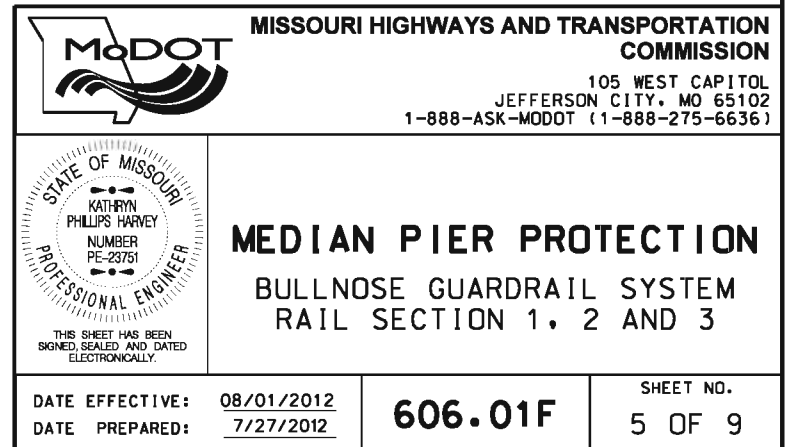
### RAIL SECTION 1 (NOSE SECTION)



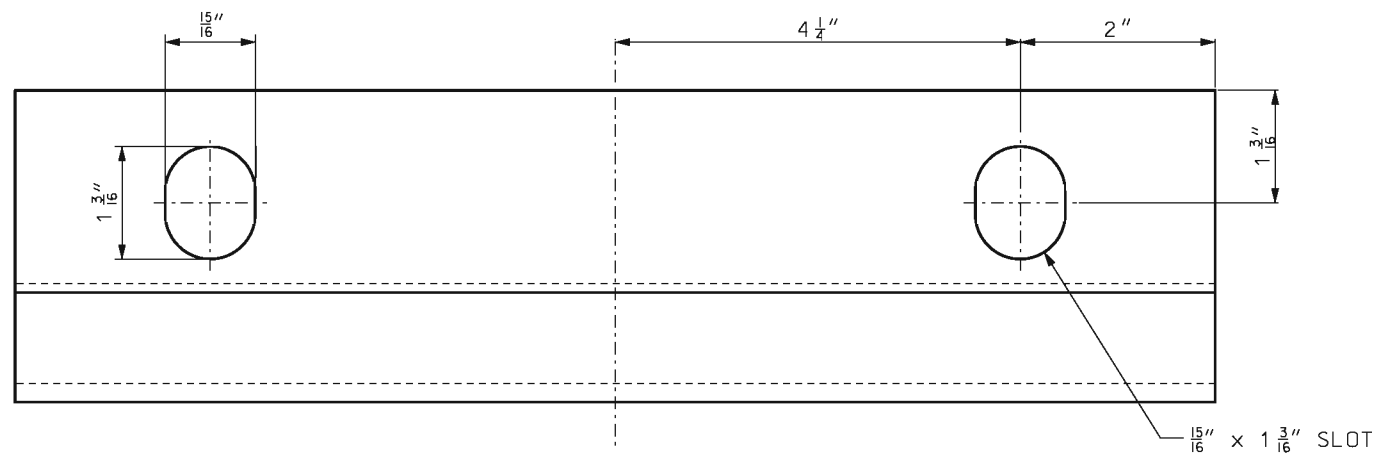
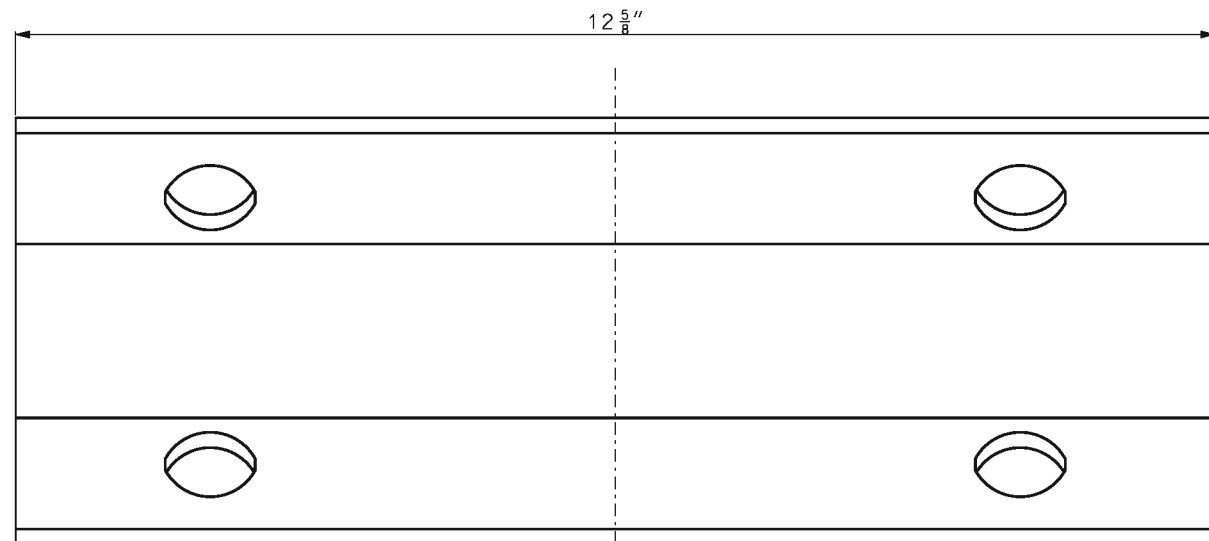
## RAIL SECTION 2



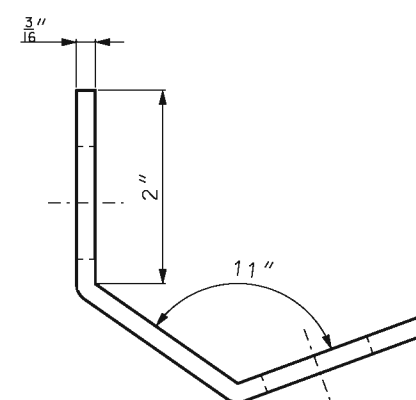
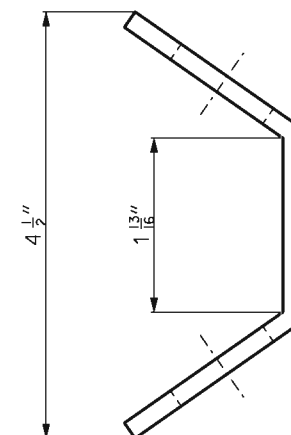
### RAIL SECTION 3



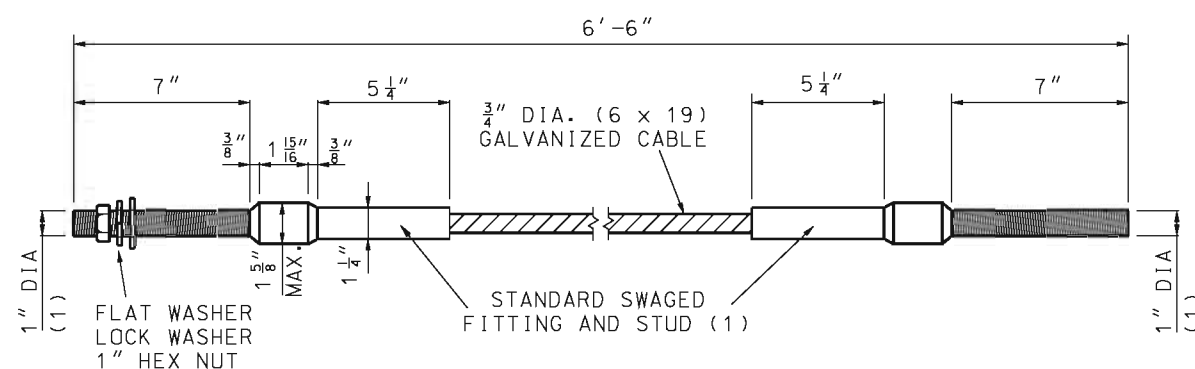
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



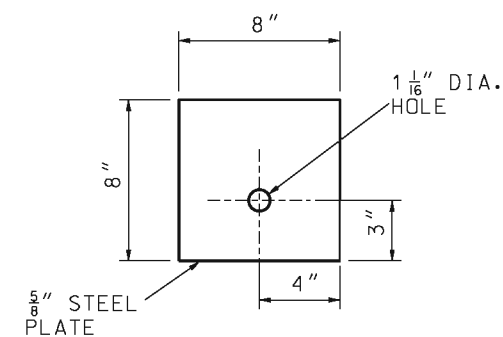
**STEEL PLATE, A306**  
**12 5/8" x 5 7/8" x 3/16"**



(1) STUD, THREADED ENTIRE LENGTH.



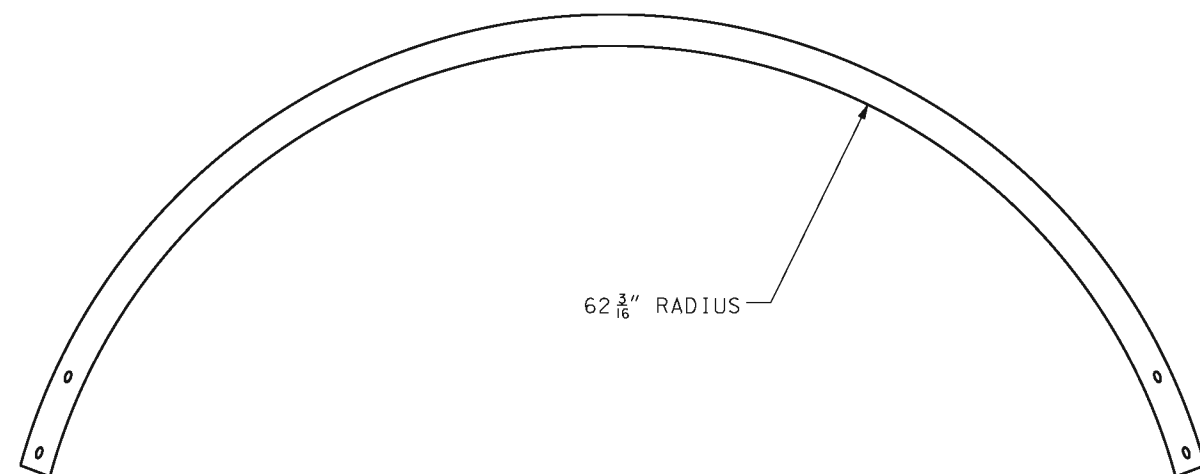
**DETAIL OF CABLE ASSEMBLY**



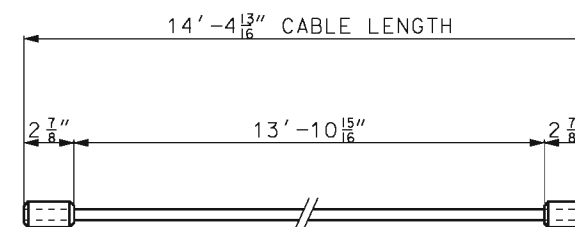
**DETAIL OF**  
**STEEL BEARING PLATE**

|                                                                                                                                                                                                                                                               |                                                                                                        |                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                              |                                                                                                        |                |
|  STATE OF MISSOURI<br>KATHRYN PHILLIPS HARVEY<br>NUMBER PE-23751<br>PROFESSIONAL ENGINEER<br><small>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</small> | <b>MEDIAN PIER PROTECTION</b><br><b>BULLNOSE GUARDRAILS SYSTEM</b><br><b>PLATES AND CABLE ASSEMBLY</b> |                |
|                                                                                                                                                                                                                                                               | DATE EFFECTIVE: 08/01/2012<br>DATE PREPARED: 7/27/2012                                                 | <b>606.01F</b> |

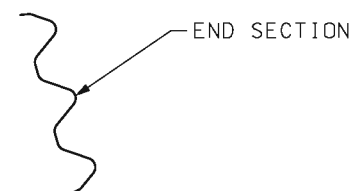




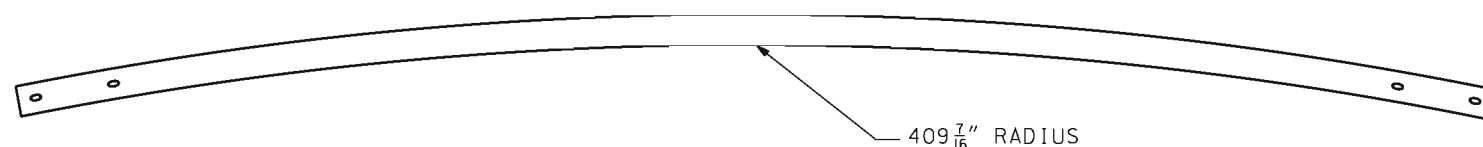
TOP VIEW, RAIL #1



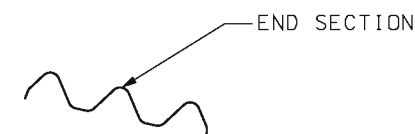
"COLD TUFF" BUTTON, S-409 SIZE NO. 12 SB 2 7/8"  
STOCK NO. 1040395 FOR 5/8" DIA (6 x 25) WIRE ROPE  
(OR ANY SIMILARLY SIZED SWAGE-GRIP BUTTON FERRULES)



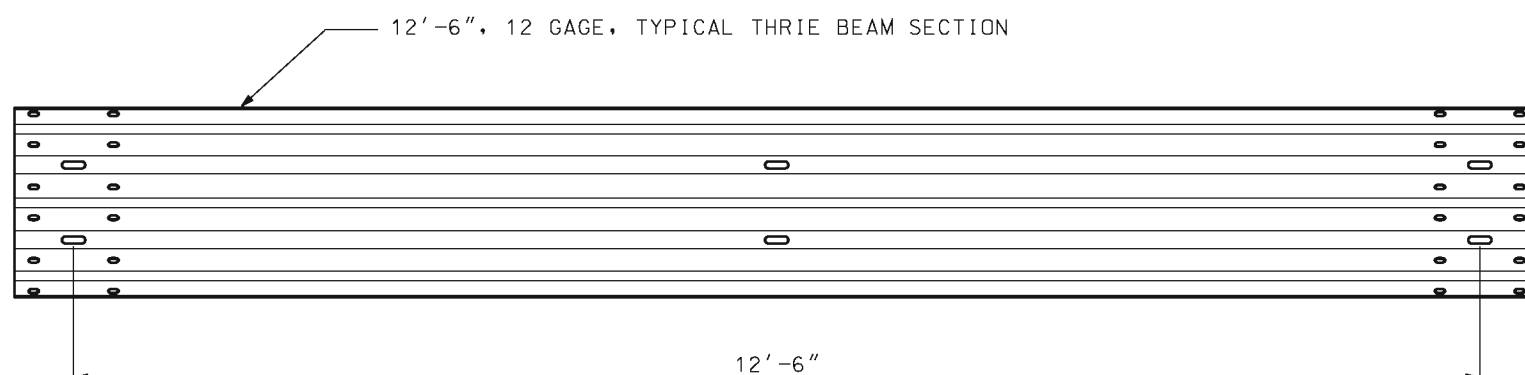
END SECTION



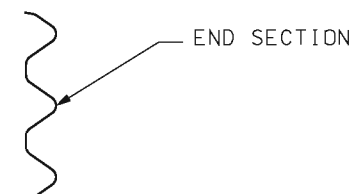
TOP VIEW, RAIL #2



END SECTION

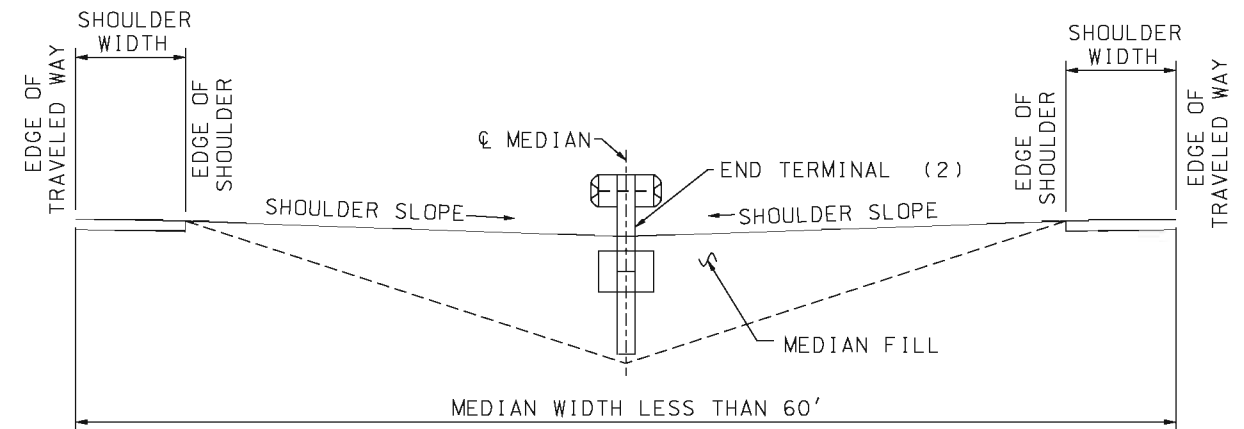


FRONT VIEW (UNBENT)

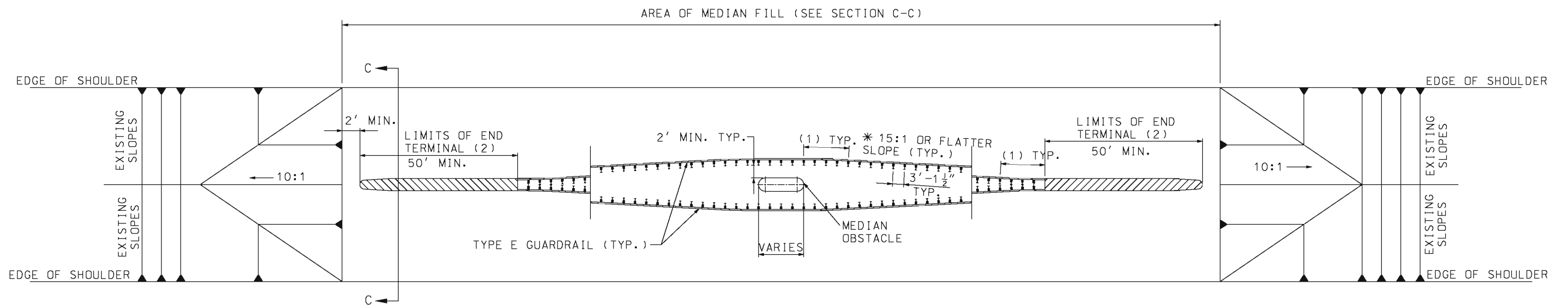


END SECTION

|                                                                                                                                                                                                                                  |                                                                                              |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                              |                |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <b>MEDIAN PIER PROTECTION</b><br>BULLNOSE GUARDRAIL SYSTEM<br>THRIE BEAM AND<br>CABLE LENGTH |                |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 08/01/2012<br>DATE PREPARED: 7/27/2012                                       | <b>606.01F</b> |



SECTION C-C



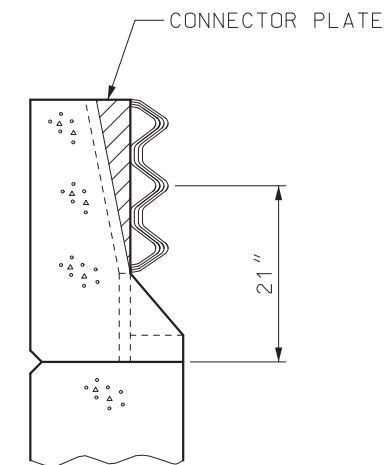
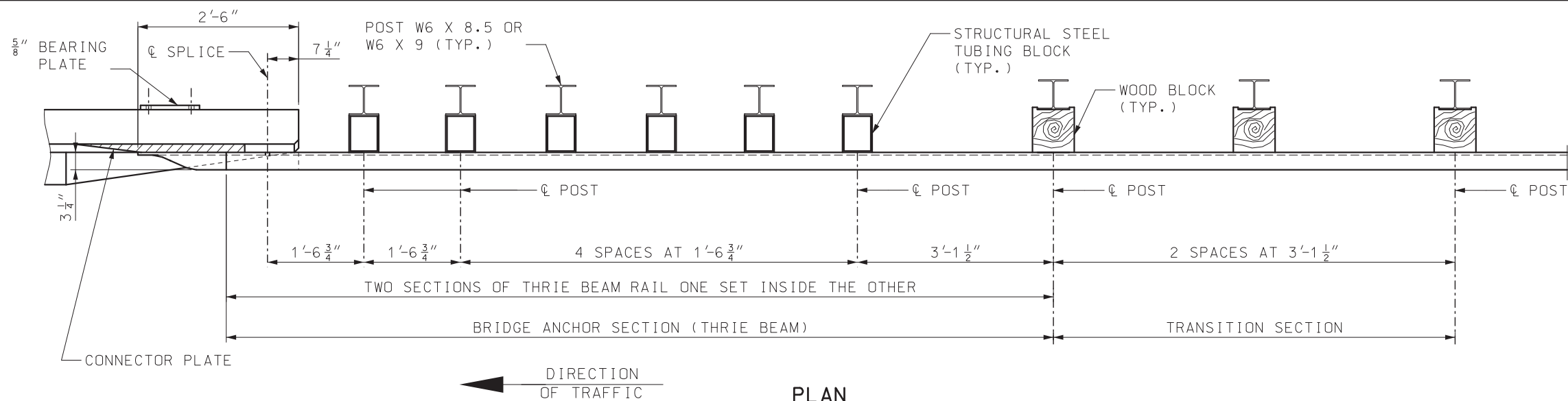
- (1) TYPE E GUARDRAIL 12'-6" IN LENGTH AND FACTORY FORMED TO THE REQUIRED RADIUS.
- (2) PAYMENT FOR THE END TERMINAL WILL BE CONSIDERED FULL COMPENSATION FOR ANY TRANSITION SECTIONS, BACKUP ASSEMBLIES, OR OTHER ITEMS NECESSARY FOR PROPER INSTALLATION AS REQUIRED BY THE MANUFACTURER.
- \* VARY SLOPE NO STEEPER THAN 15:1 TO UTILIZE A FULL 12.5' LENGTH OF GUARDRAIL WHEN ATTACHING TO THE CRASHWORTHY END TERMINAL.

GENERAL NOTES:

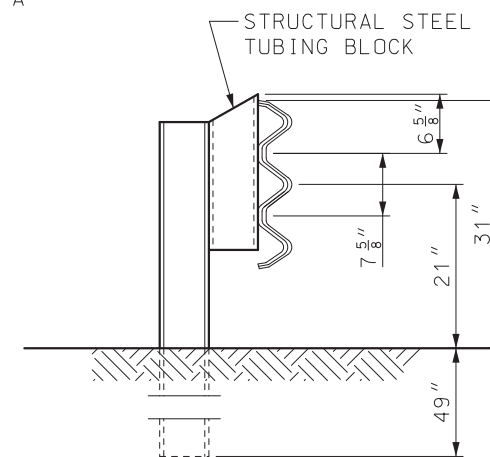
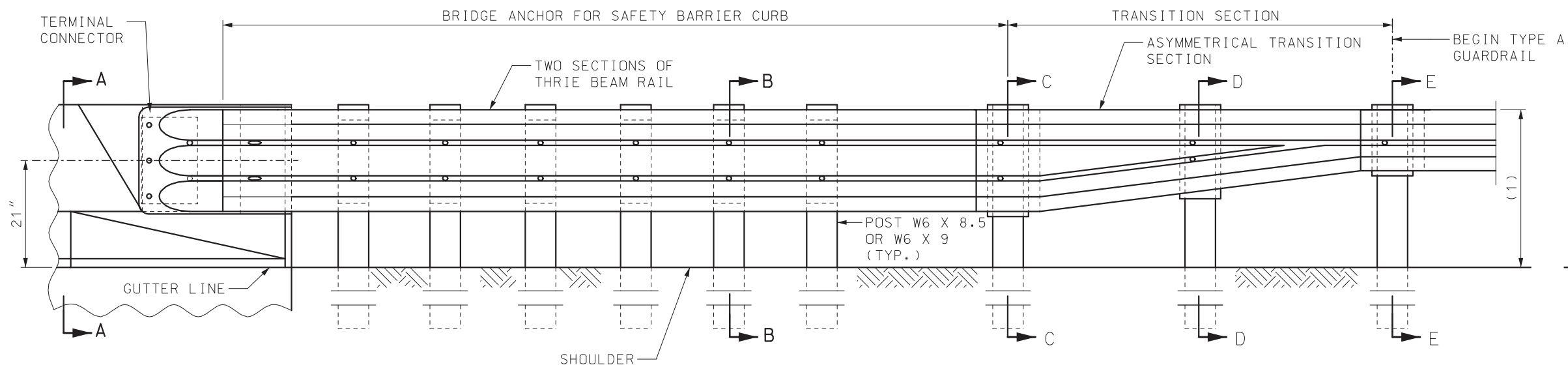
TYPE B CRASHWORTHY END TERMINAL SHALL BE LATEST VERSION AND SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMENDATIONS.

|                                                                                                                                                                                                                                  |                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <p><b>TYPE E MEDIAN PIER PROTECTION</b></p> <p><b>MEDIAN LESS THAN 60'</b></p> |
| DATE EFFECTIVE: 08/01/2012<br>DATE PREPARED: 7/27/2012                                                                                                                                                                           | <p><b>606.01F</b></p>                                                          |
| SHEET NO.<br>8 OF 9                                                                                                                                                                                                              |                                                                                |



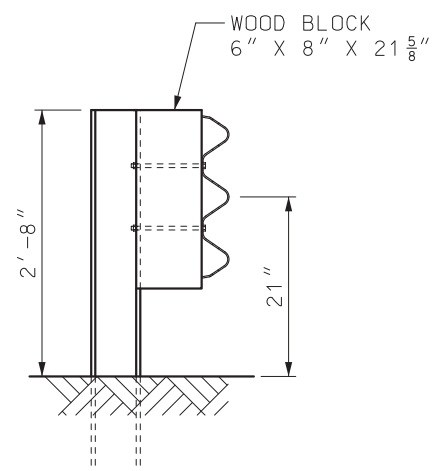


SECTION A-A

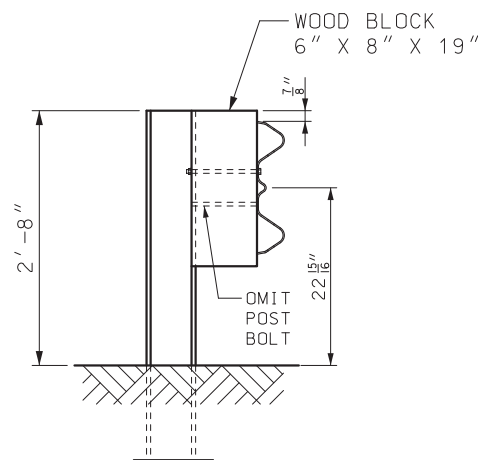


SECTION B-B

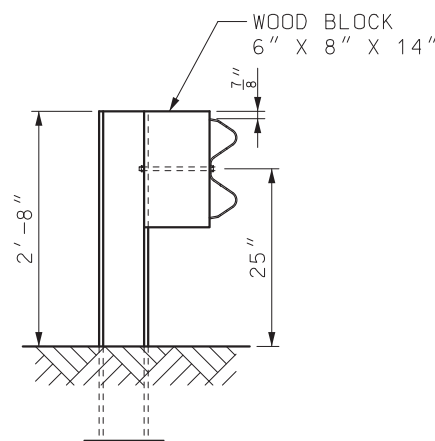
(1) TRANSITION FROM 31" TO 29" HEIGHT OVER NEXT TWO UPSTREAM 12'-6" W-BEAM RAILS.



SECTION C-C



SECTION D-D



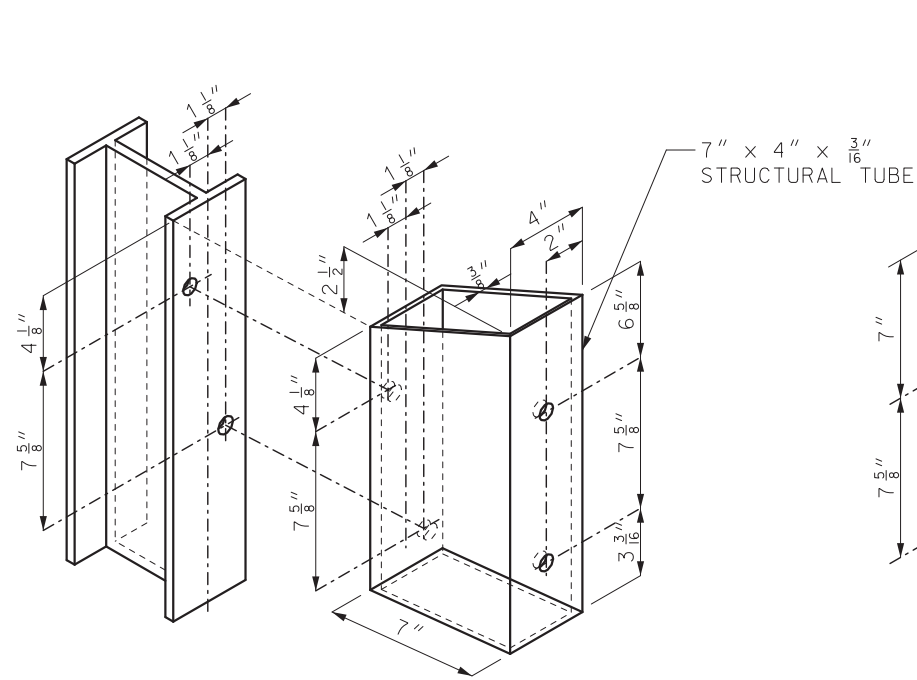
SECTION E-E

NOTES:

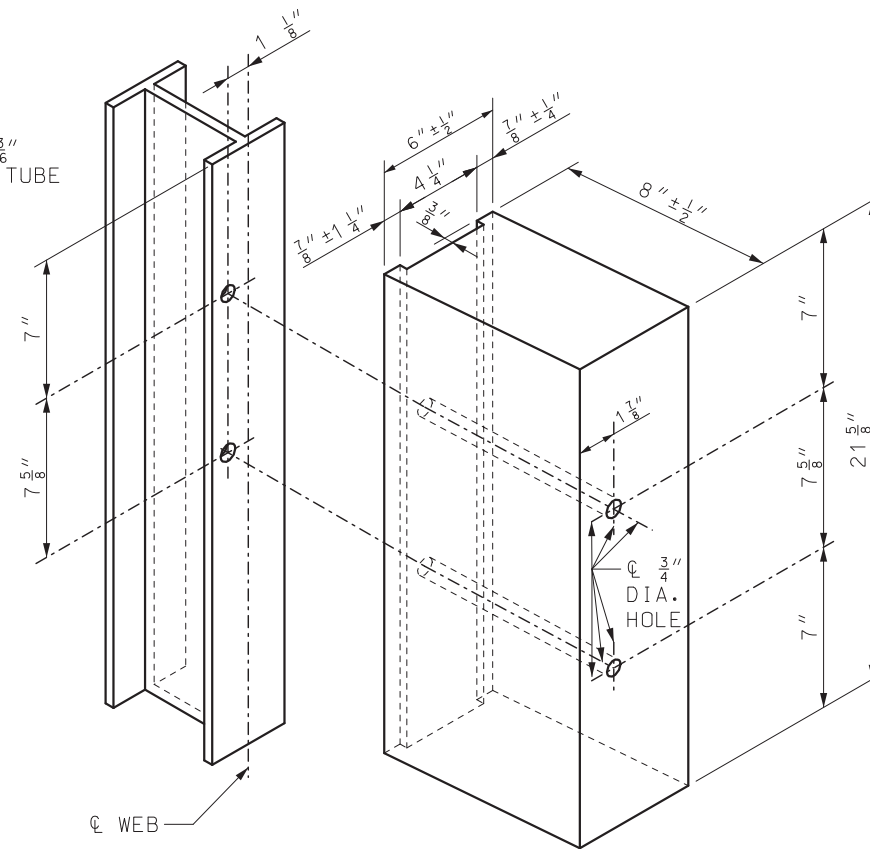
FOR GENERAL NOTES, SEE SHEET 3.

FOR DETAILS OF BLOCK ON STEEL POSTS, SEE SHEET 2.

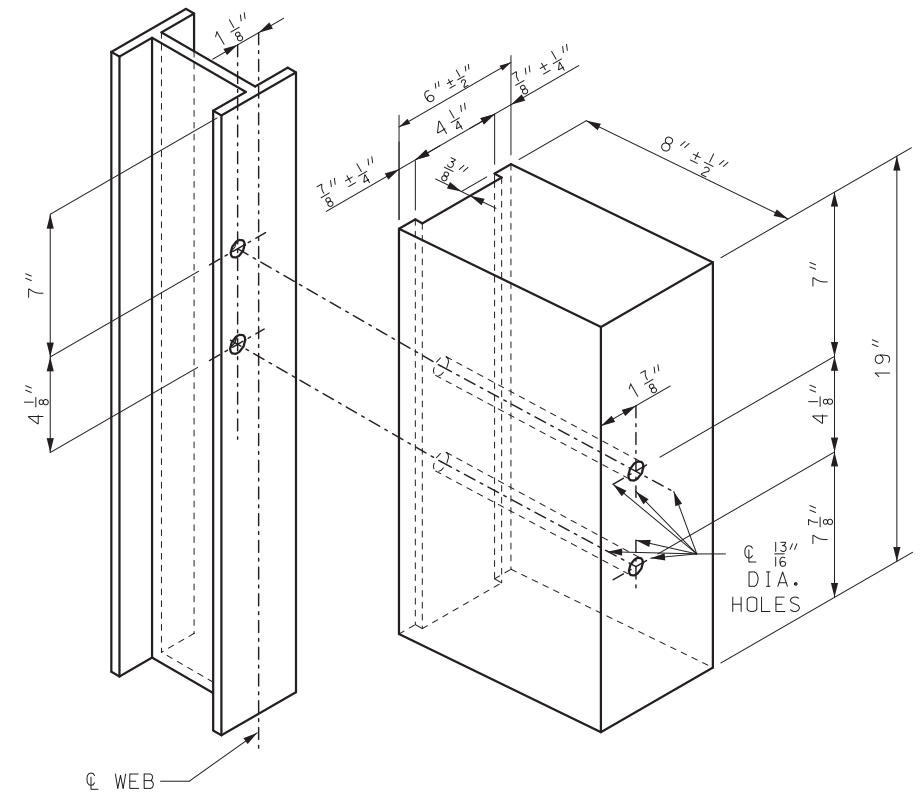
|                                                                                                                                                         |                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                                 |
|                                                                                                                                                         | <p><b>BRIDGE ANCHOR SECTION</b></p> <p><b>SAFETY BARRIER CURB ON BRIDGE</b></p> |
| <p>DATE EFFECTIVE: 7/1/2025</p> <p>DATE PREPARED: 3/21/2025</p>                                                                                         | <p>606.22V</p> <p>SHEET NO.<br/>1 OF 6</p>                                      |



STRUCTURAL STEEL TUBING BLOCK DETAIL

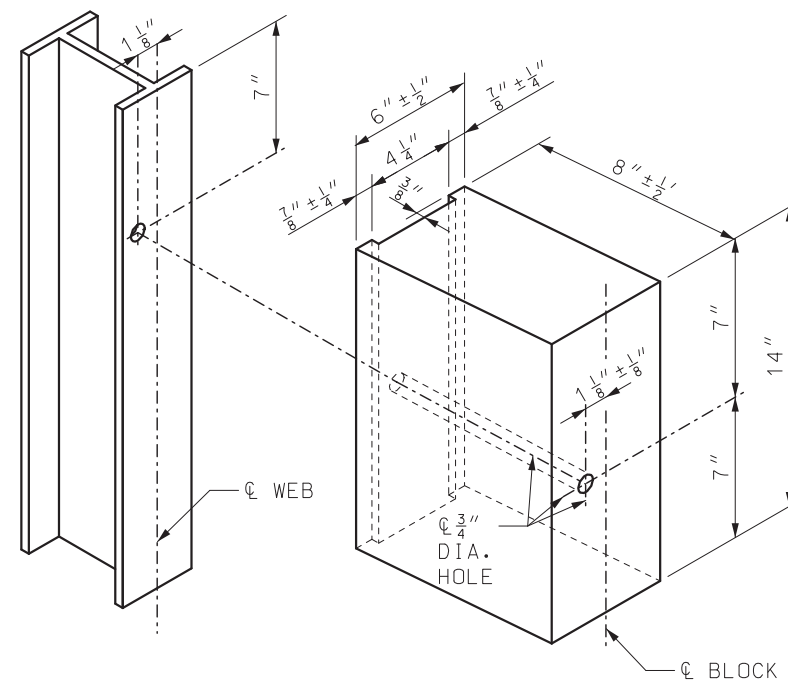


21 <sup>5</sup>/<sub>8</sub> " WOOD BLOCK DETAIL



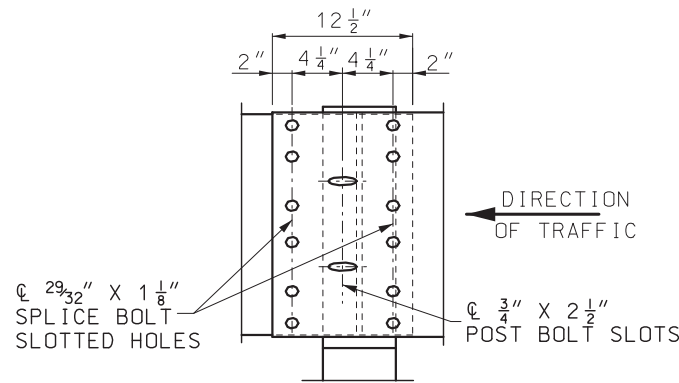
19 " WOOD BLOCK DETAIL

ALL HOLES DRILLED OR PUNCHED <sup>13</sup>/<sub>16</sub> " DIA.



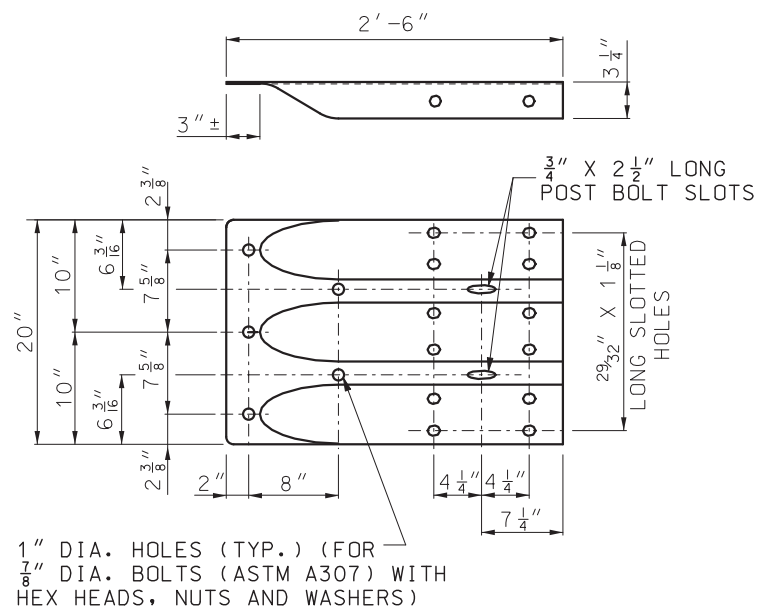
14 " WOOD BLOCK DETAIL

|                                                                                                                                                                                                                                  |                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                      |
|                                                                                                                                             | <b>BRIDGE ANCHOR SECTION</b><br><b>SAFETY BARRIER CURB ON BRIDGE</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/21/2025                                                                                                                                                                             | 606.22V                                                              |
| SHEET NO. 2 OF 6                                                                                                                                                                                                                 |                                                                      |

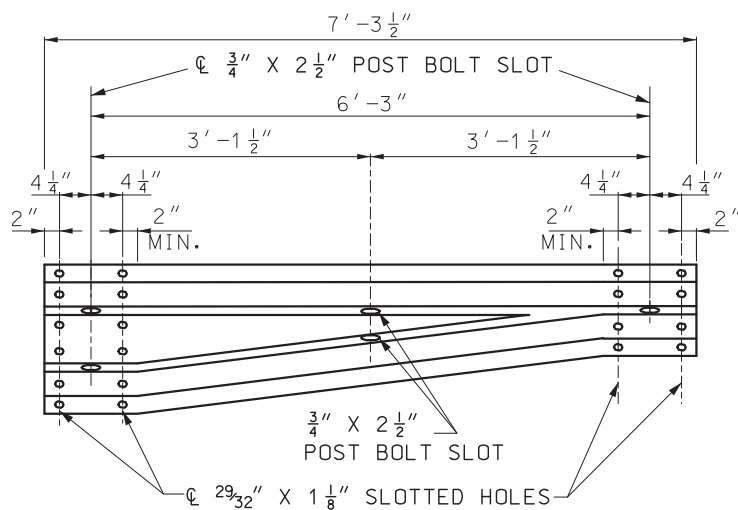


### THRIE BEAM RAIL SPLICE AT POST

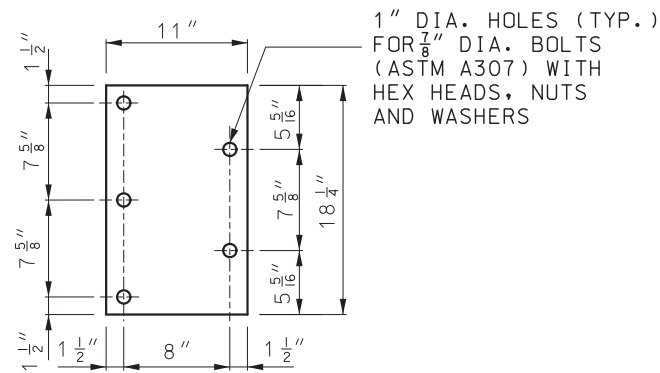
- (1) THE CONTRACTOR MAY, AT HIS OPTION, FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A769 GRADE 36 OR 40. THE SECTIONS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH REQUIREMENTS OF AASHTO M 111.



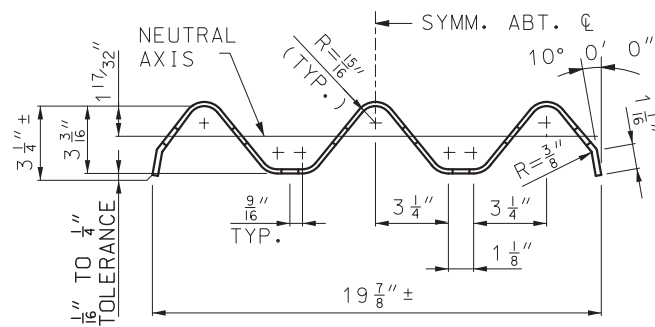
### TERMINAL CONNECTOR



### ASYMMETRICAL TRANSITION SECTION



### 5/8" BEARING PLATE



### SECTION THROUGH THRIE BEAM RAIL

#### GENERAL NOTES:

DESIGN BASED ON NCHRP REPORT 350 TEST LEVEL 3.

THE THRIE BEAM RAIL, TERMINAL CONNECTOR AND THE TRANSITION SECTION FOR THE BRIDGE ANCHOR SECTION SHALL BE MADE OF STEEL AND SHALL BE 12 GAGE.

FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SECTION 1040 OF THE STANDARD SPECIFICATIONS.

RAIL POSTS SHALL BE SET PERPENDICULAR TO THE ROADWAY PROFILE GRADE AND VERTICALLY IN CROSS SECTION.

WASHERS SHALL BE USED AT ALL POST BOLTS.

STRUCTURAL TUBING BLOCK SHALL BE FABRICATED FROM ASTM A500 GRADE B STEEL AND GALVANIZED.

USE 5/8" BUTTON-HEAD OVAL SHOULDER BOLTS WITH HEX NUTS AT ALL SLOTS (THICKNESS OF HEX NUTS = 3/8" MIN.).

THE BEARING PLATE SHALL BE FABRICATED FROM GRADE A36 STEEL AND GALVANIZED.

ALL LAP SPLICES, INCLUDING END SHOES, SHALL BE MADE IN THE DIRECTION OF TRAFFIC.

SEE STANDARD PLAN 606.00 FOR DETAILS NOT SHOWN.

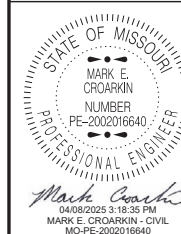
THE COST OF FURNISHING, FABRICATING AND INSTALLING TRANSITION SECTION, COMPLETE IN PLACE, WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

THE COST OF FURNISHING FABRICATING AND INSTALLING BRIDGE ANCHOR SECTION (SAFETY BARRIER CURB), COMPLETE IN PLACE, WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.



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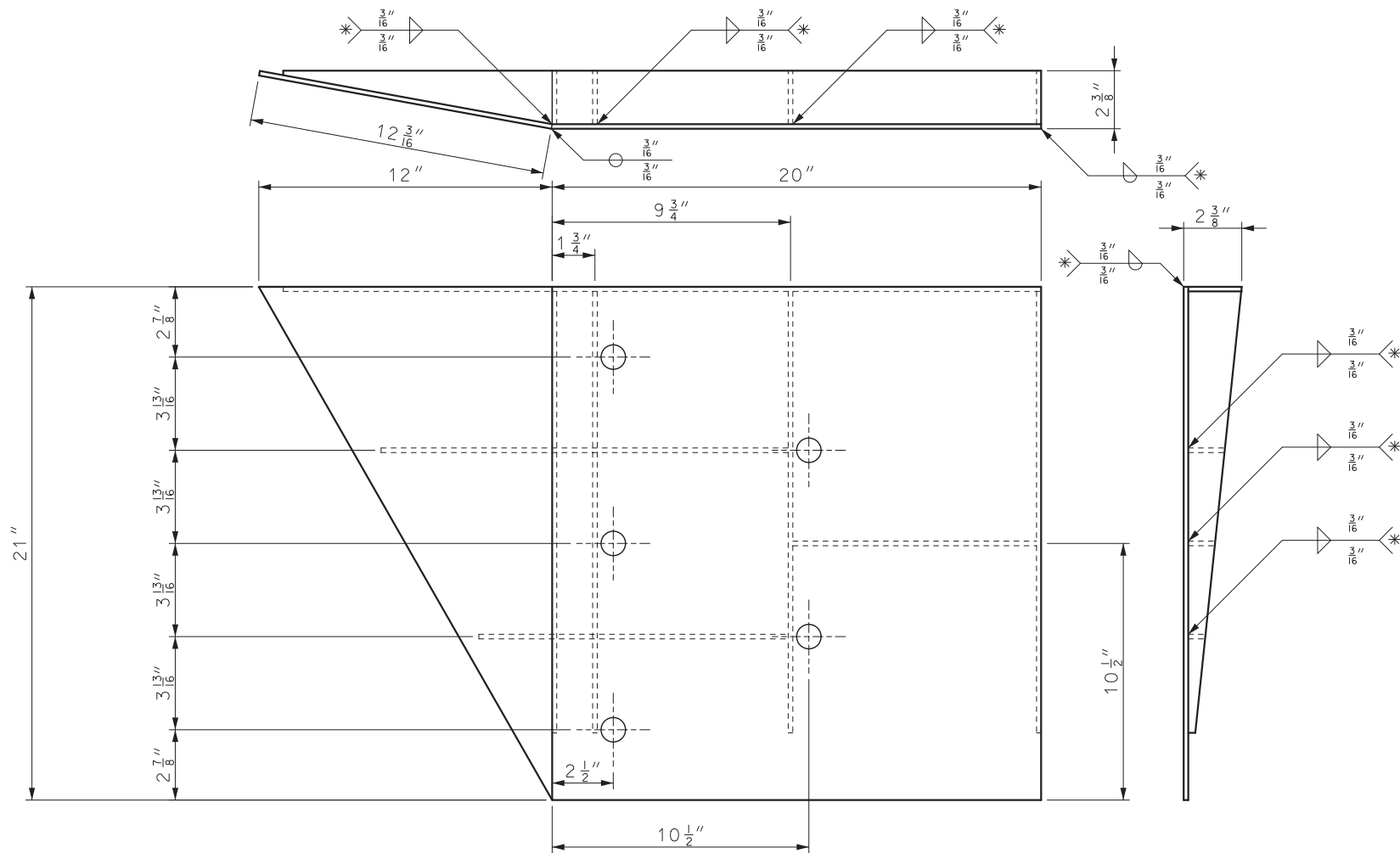


#### BRIDGE ANCHOR SECTION SAFETY BARRIER CURB ON BRIDGE

DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/21/2025

606.22V

SHEET NO.  
3 OF 6



### WELDING INSTRUCTION

\* ALL FILLET WELDS SHALL BE 1" LONG SPACED AT 2".

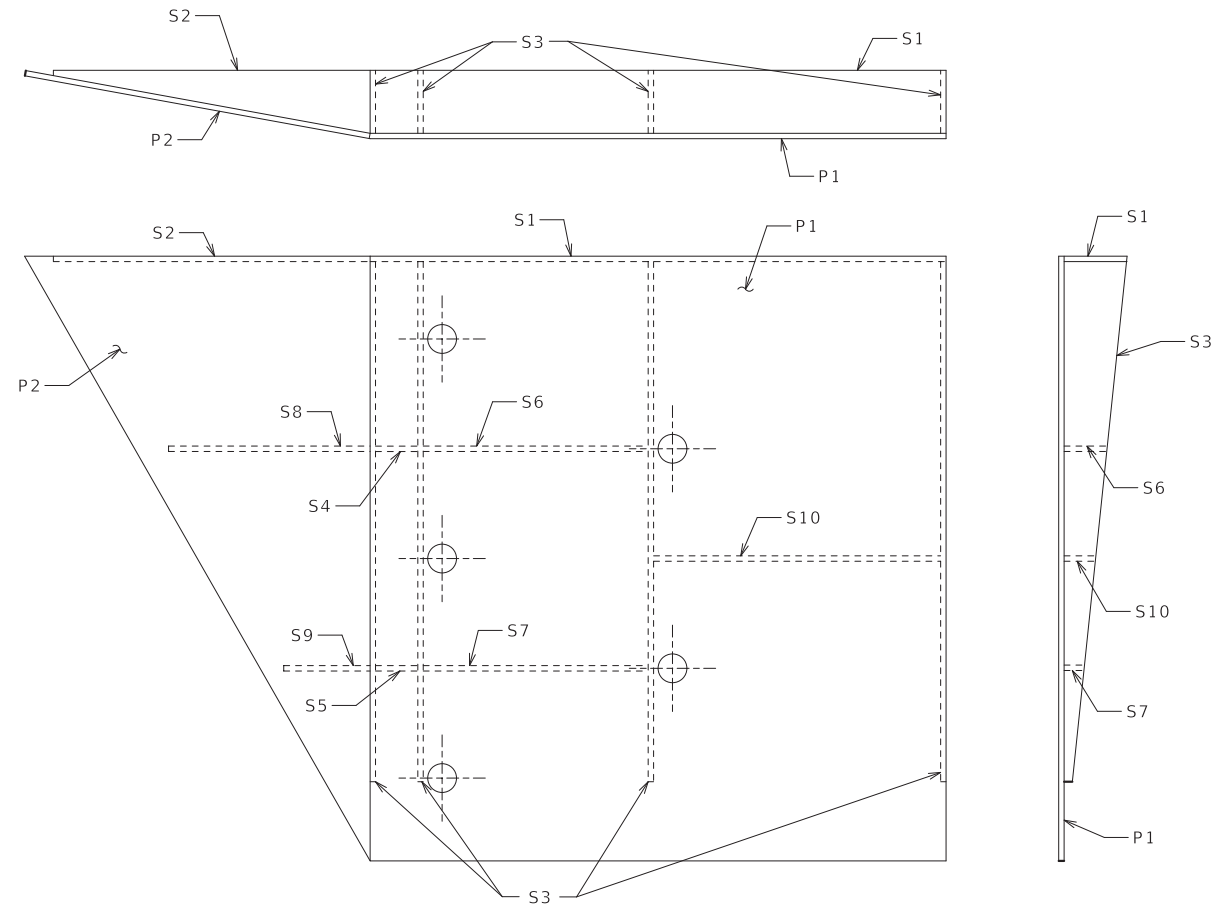


PLATE AND STIFFENER IDENTIFICATION

| CONNECTOR PLATE DIMENSIONS<br>(PER ASSEMBLY) |          |       |                          |
|----------------------------------------------|----------|-------|--------------------------|
| PIECE                                        | QUANTITY | SHAPE | DIMENSIONS (A x B x C)   |
| P1                                           | 1        |       | 20" x 21"                |
| P2                                           | 1        |       | 21" x 12 3/16"           |
| S1                                           | 1        |       | 20" x 2 3/16"            |
| S2                                           | 1        |       | 11" x 2 3/16" x 3/16"    |
| S3                                           | 4        |       | 18 1/4" x 2 3/16" x 1/4" |
| S4                                           | 1        |       | 1 3/8" x 1 1/2"          |
| S5                                           | 1        |       | 1 3/8" x 1 1/16"         |
| S6                                           | 1        |       | 7 3/4" x 1 1/2"          |
| S7                                           | 1        |       | 7 3/4" x 1 1/16"         |
| S8                                           | 1        |       | 7" x 1 1/2" x 1/4"       |
| S9                                           | 1        |       | 3" x 1 1/16" x 1/8"      |
| S10                                          | 1        |       | 9 7/8" x 1 1/16"         |

### GENERAL NOTES:

COVER PLATE PANELS ARE  $\frac{3}{16}$ " THICK.

ALL STIFFENERS ARE  $\frac{1}{4}$ " THICK.

CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE A36 STEEL AND GALVANIZED.

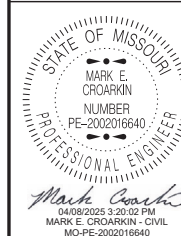
FOR GALVANIZED REQUIREMENTS, SEE SEC 1040.

ALL HOLE DIAMETERS SHALL BE 1".



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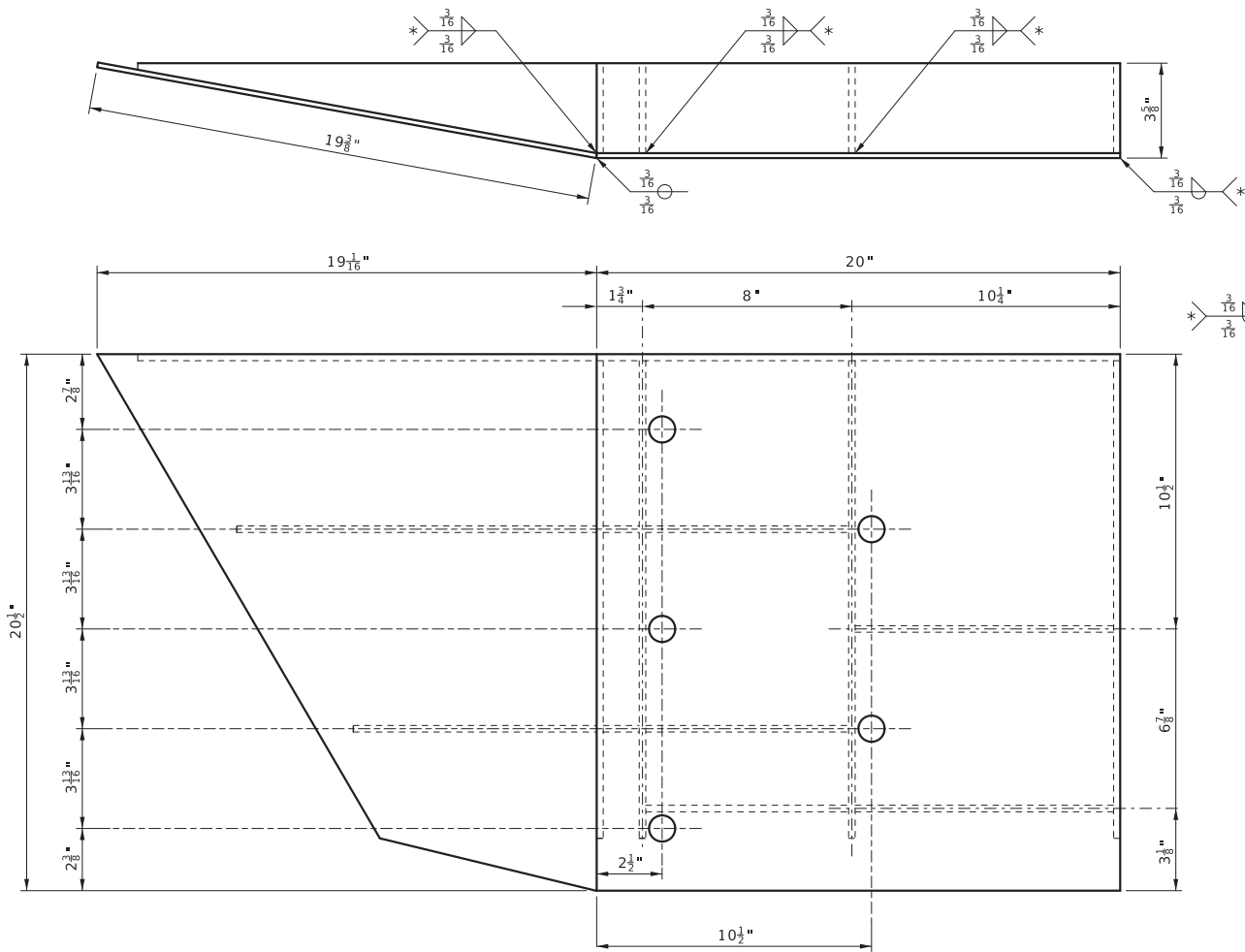


### BRIDGE ANCHOR SECTION SAFETY BARRIER CURB ON BRIDGE (CONNECTOR PLATE DETAIL)

DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/21/2025

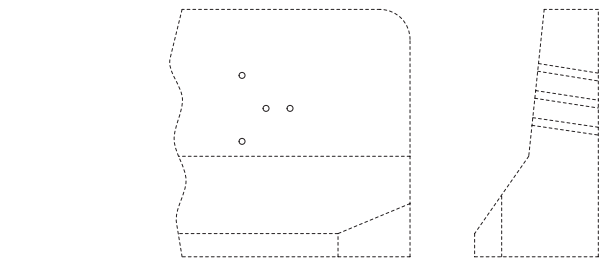
606.22V

SHEET NO.  
4 OF 6

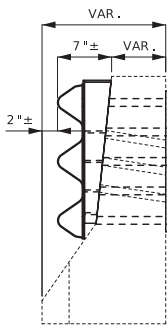


WELDING INSTRUCTIONS

\* ALL FILLET WELDS SHALL BE 1" LONG SPACED AT 2".



1970s & 80s BARRIER END



INSTALLATION DETAIL

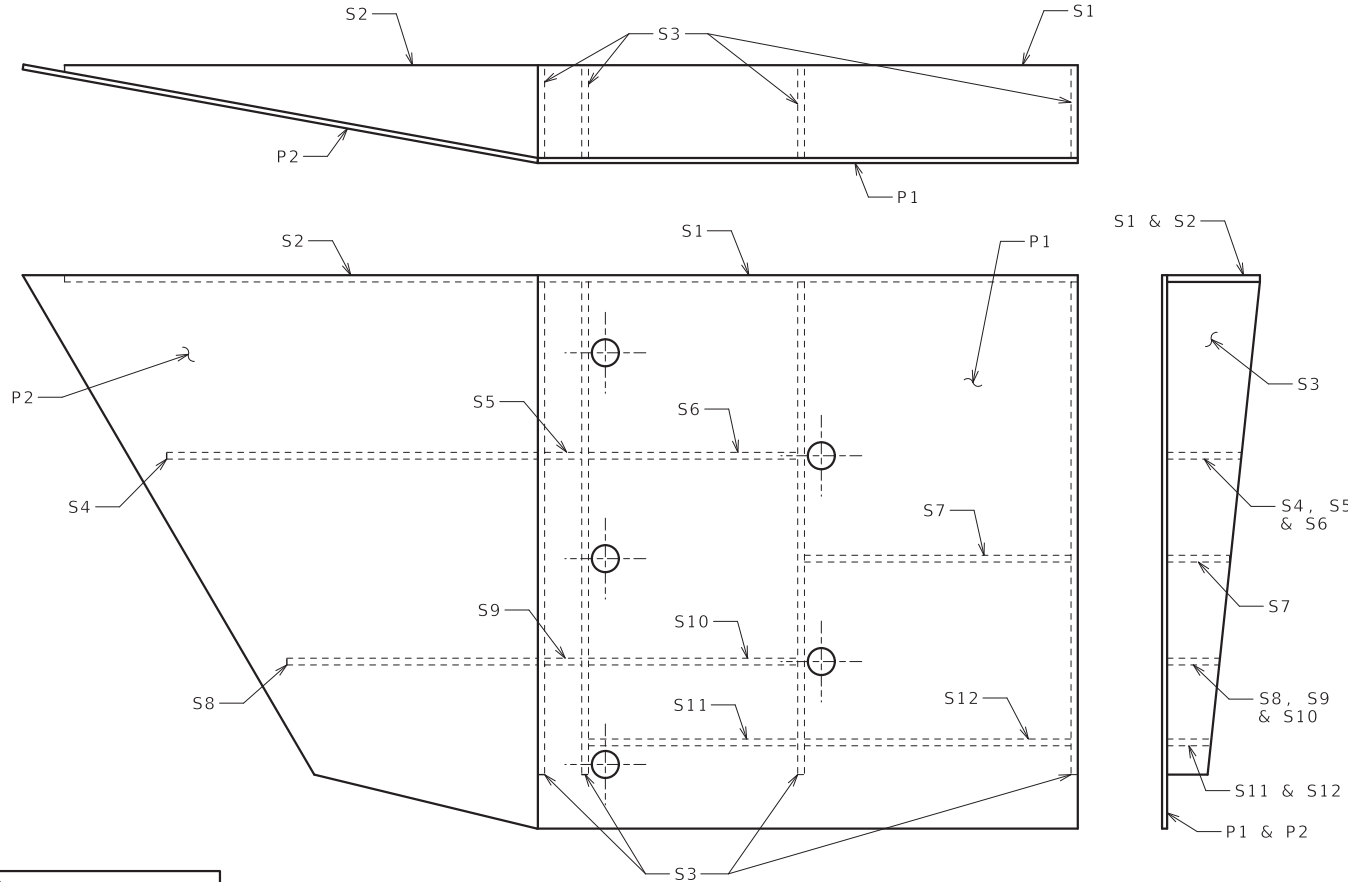
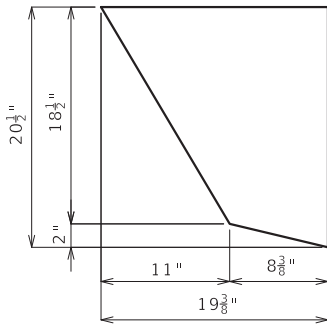


PLATE AND STIFFENER IDENTIFICATION



P2 DETAIL

| CONNECTOR PLATE DIMENSIONS<br>(PER ASSEMBLY) |          |       |                          |
|----------------------------------------------|----------|-------|--------------------------|
| PIECE                                        | QUANTITY | SHAPE | DIMENSIONS (A x B x C)   |
| P1                                           | 1        |       | 20" x 20 1/2"            |
| P2                                           | 1        |       | SEE P2 DETAIL            |
| S1                                           | 1        |       | 20" x 2 3/16"            |
| S2                                           | 1        |       | 11" x 2 3/16" x 3/16"    |
| S3                                           | 4        |       | 18 1/4" x 2 3/16" x 1/4" |
| S4                                           | 1        |       | 1 3/8" x 1 1/2"          |
| S5                                           | 1        |       | 1 3/8" x 1 1/16"         |
| S6                                           | 1        |       | 7 3/4" x 1 1/2"          |
| S7                                           | 1        |       | 7 3/4" x 1 1/16"         |
| S8                                           | 1        |       | 7" x 1 1/2" x 1/4"       |
| S9                                           | 1        |       | 3" x 1 1/16" x 1/8"      |
| S10                                          | 1        |       | 9 7/8" x 1 1/16"         |

GENERAL NOTES:

COVER PLATE PANELS ARE  $\frac{3}{16}$ " THICK.

ALL STIFFENERS ARE  $\frac{1}{4}$ " THICK.

CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE A36 STEEL AND GALVANIZED.

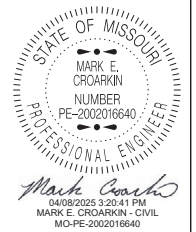
FOR GALVANIZED REQUIREMENTS, SEE SEC 1040.

ALL HOLE DIAMETERS SHALL BE 1".



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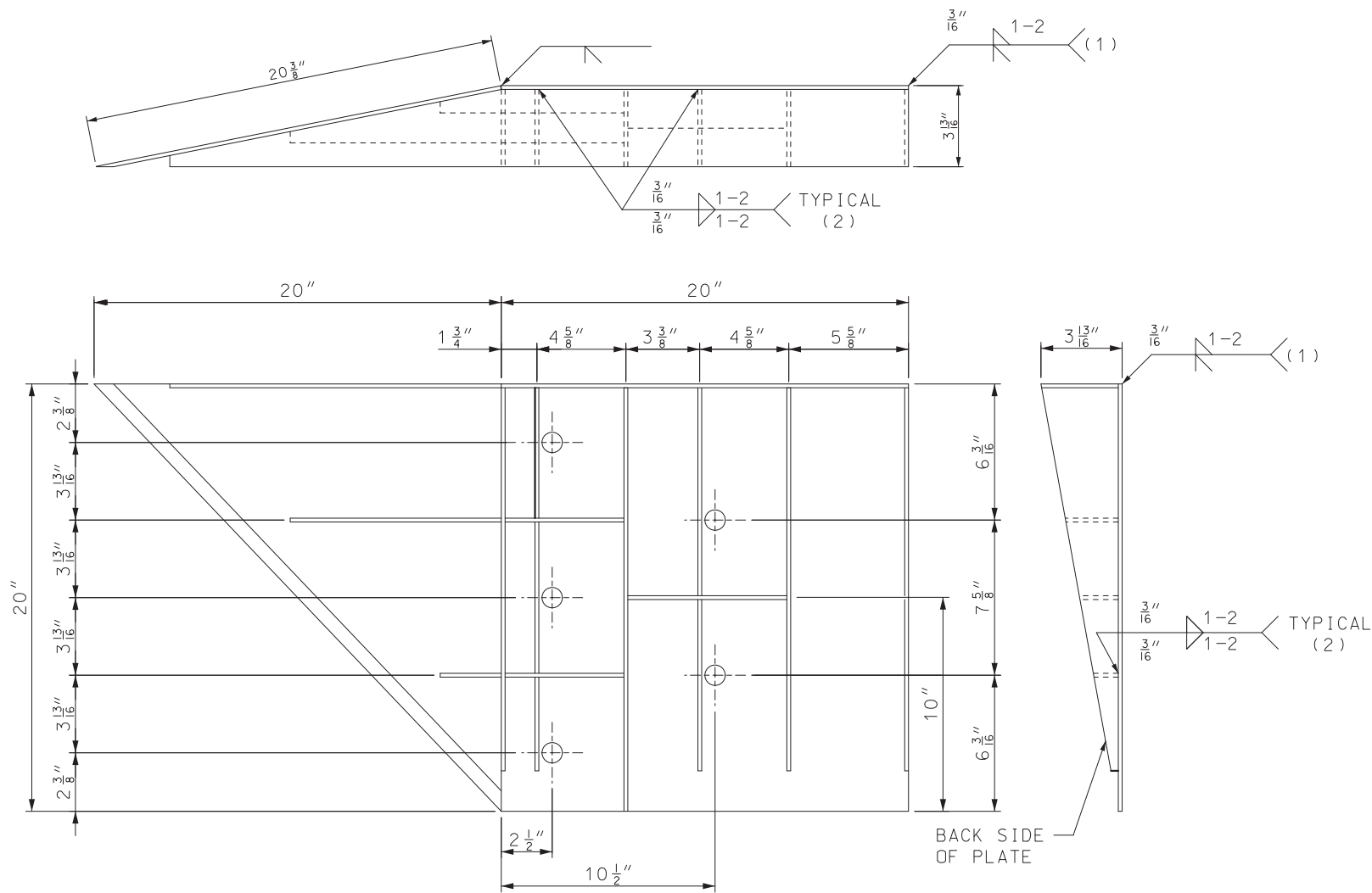


**BRIDGE ANCHOR SECTION**

**SAFETY BARRIER CURB ON BRIDGE**  
**(1970s & 80s BARRIER**  
**CONNECTOR PLATE DETAIL)**

|                 |           |         |                     |
|-----------------|-----------|---------|---------------------|
| DATE EFFECTIVE: | 7/1/2025  | 606.22V | SHEET NO.<br>5 OF 6 |
| DATE PREPARED:  | 3/21/2025 |         |                     |





WELDING INSTRUCTION  
(VIEWED FROM BACK SIDE OF PLATE)

- (1) STIFFENERS LOCATED AT THE OUTSIDE EDGES OF THE COVER PLATES SHALL BE WELDED AS FOLLOWS:  
SINGLE BEVEL GROOVE WELD ON EXTERNAL SIDES AND  $\frac{3}{16}$ " FILLET WELD BY 1" LONG SPACED AT 2" ON INTERNAL SIDES.
- (2) STIFFENERS LOCATED ON THE INSIDE OF THE COVER PLATE SHALL BE WELDED AS FOLLOWS:  
 $\frac{3}{16}$ " FILLET WELD BY 1" LONG SPACED AT 2".

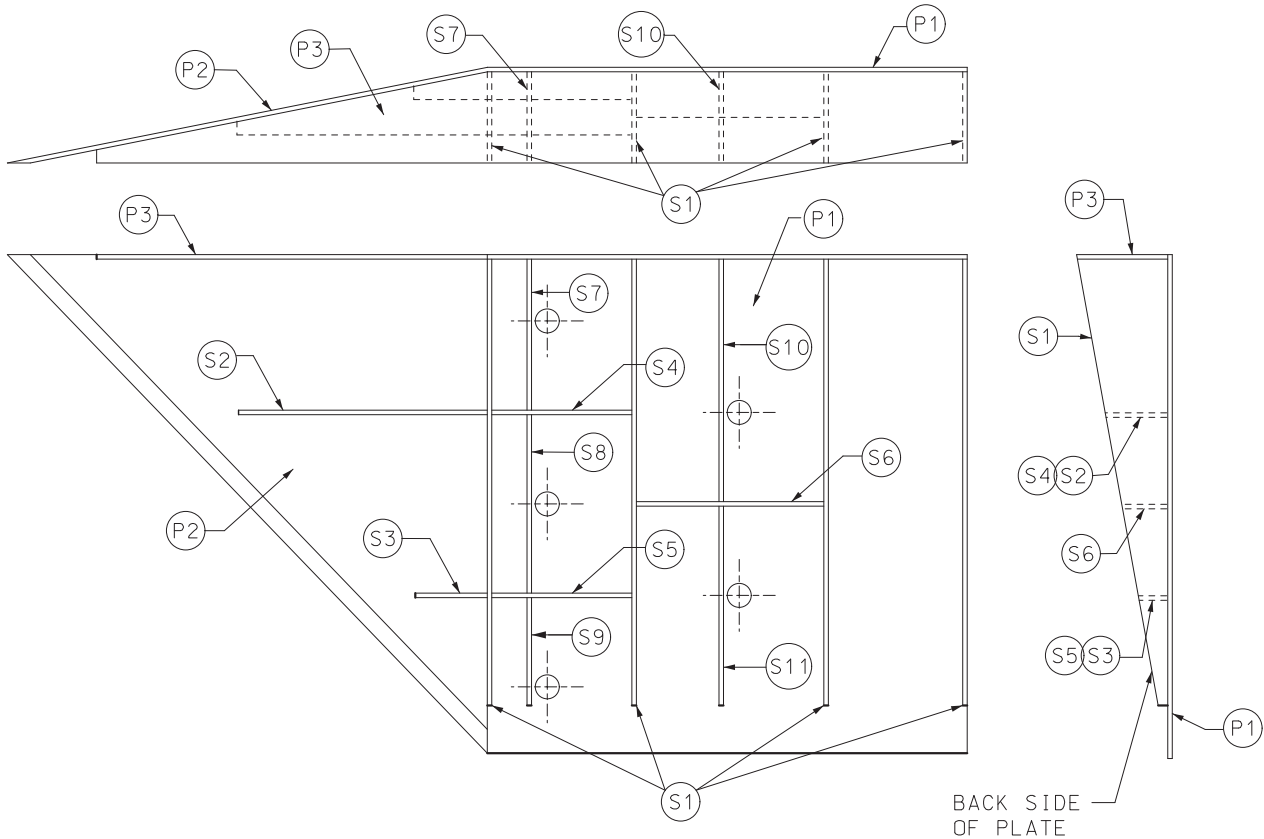


PLATE AND STIFFENER IDENTIFICATION  
(VIEWED FROM BACK SIDE OF PLATE)

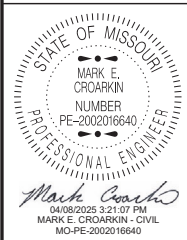
| CONNECTOR PLATE DIMENSIONS<br>(PER ASSEMBLY) |          |       |                                                                                 |
|----------------------------------------------|----------|-------|---------------------------------------------------------------------------------|
| PIECE                                        | QUANTITY | SHAPE | SIZE (A x B x C x D)                                                            |
| P1                                           | 1        | B     | 20" x 20"                                                                       |
| P2                                           | 1        | B     | 20" x 20" x 28 $\frac{3}{16}$ "                                                 |
| P3                                           | 1        | B     | 39" x 3 $\frac{5}{8}$ " x 20" x 19 $\frac{5}{16}$ "                             |
| S1                                           | 4        | B     | 18 $\frac{7}{16}$ " x 3 $\frac{5}{8}$ " x 18 $\frac{3}{4}$ "                    |
| S2                                           | 1        | B     | 10 $\frac{1}{4}$ " x 2 $\frac{7}{16}$ " x 10 $\frac{3}{8}$ " x $\frac{1}{2}$ "  |
| S3                                           | 1        | B     | 3" x 1 $\frac{1}{16}$ " x 3 $\frac{1}{8}$ " x $\frac{1}{2}$ "                   |
| S4                                           | 1        | B     | 6 $\frac{1}{8}$ " x 2 $\frac{7}{16}$ "                                          |
| S5                                           | 1        | B     | 6 $\frac{1}{8}$ " x 1 $\frac{1}{16}$ "                                          |
| S6                                           | 1        | B     | 7 $\frac{3}{4}$ " x 1 $\frac{3}{4}$ "                                           |
| S7                                           | 1        | A     | 2 $\frac{9}{16}$ " x 6" x 3 $\frac{5}{8}$ " x 5 $\frac{7}{8}$ "                 |
| S8                                           | 1        | A     | 1 $\frac{5}{32}$ " x 7 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ " x 7 $\frac{3}{8}$ "  |
| S9                                           | 1        | C     | 6 $\frac{1}{16}$ " x 6 $\frac{3}{16}$ " x 1 $\frac{3}{32}$ "                    |
| S10                                          | 1        | A     | 1 $\frac{7}{8}$ " x 9 $\frac{7}{8}$ " x 3 $\frac{5}{8}$ " x 9 $\frac{11}{16}$ " |
| S11                                          | 1        | C     | 8 $\frac{1}{2}$ " x 8 $\frac{3}{4}$ " x 1 $\frac{13}{16}$ "                     |

- GENERAL NOTES:
- COVER PLATE PANELS ARE  $\frac{3}{16}$ " THICK.
- ALL STIFFENERS ARE  $\frac{1}{4}$ " THICK.
- CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE A36 STEEL AND GALVANIZED.
- FOR GALVANIZED REQUIREMENTS, SEE SEC 1040.
- ALL HOLE DIAMETERS SHALL BE 1".



MISSOURI HIGHWAYS AND TRANSPORTATION  
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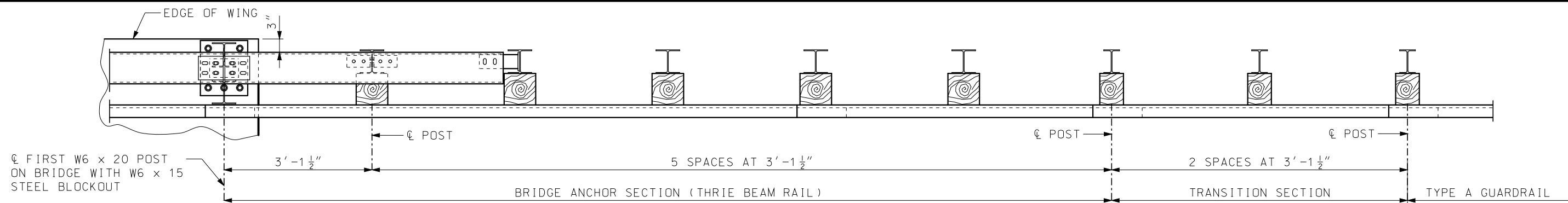


BRIDGE ANCHOR SECTION  
SAFETY BARRIER CURB ON BRIDGE  
(SINGLE SLOPE BARRIER  
CONNECTOR PLATE DETAIL)

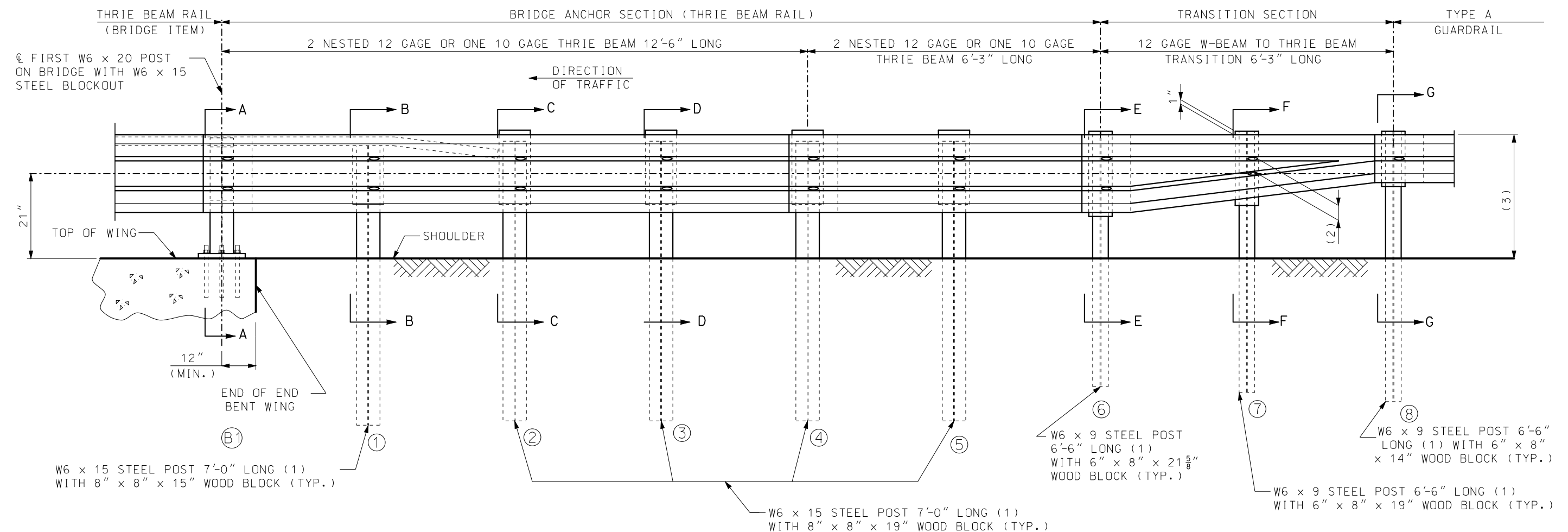
DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/21/2025

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SHEET NO.  
6 OF 6



PLAN



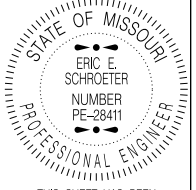
PART SECTION THROUGH SLAB AT END OF WING

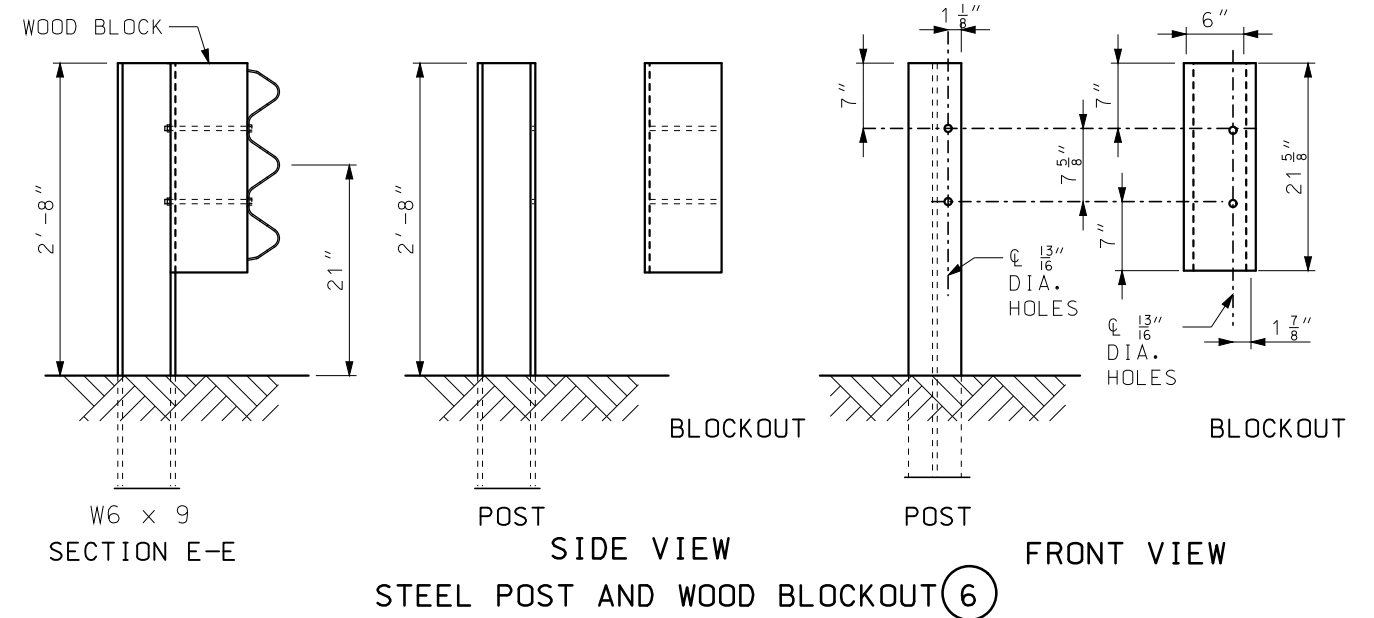
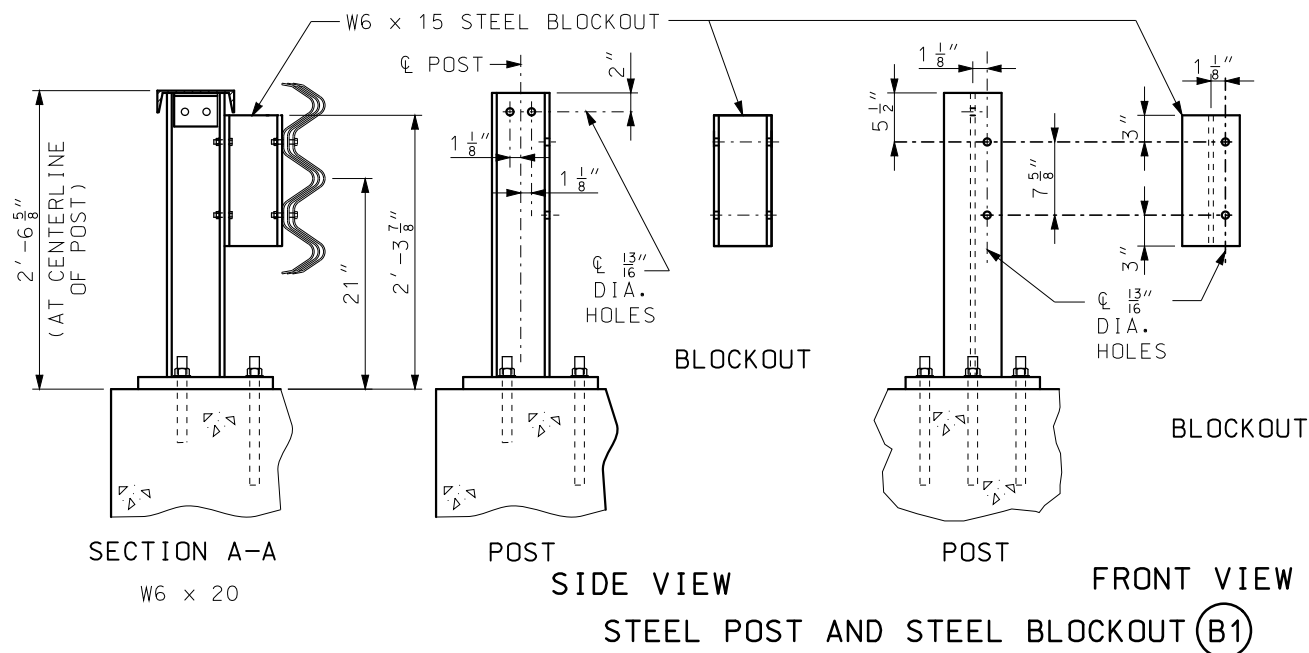
NOTES:

FOR GENERAL NOTES, SEE SHEET 2 OF 5.

FOR POST DETAILS AND SECTION VIEWS, SEE SHEET 2 AND 3 OF 5.

- (1) AT CONTRACTOR'S OPTION, EQUIVALENT SECTIONS MAY BE FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A769 GRADE 36 OR 40. THE SECTIONS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO 111.
- (2) VERIFY BY RAIL TRANSITION PRODUCER.
- (3) TRANSITION FROM 31" TO 29" HEIGHT OVER NEXT TWO UPSTREAM 12'-6" W-BEAM RAILS.

|                                                                                                                                                                                                                                  |                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                    |
|                                                                                                                                             | <b>BRIDGE ANCHOR SECTION</b><br><b>(THRIE BEAM RAIL ON BRIDGE)</b> |
| DATE EFFECTIVE: 7/01/016<br>DATE PREPARED: 5/13/2016                                                                                                                                                                             | 606.23J<br>SHEET NO.<br>1 OF 5                                     |



GENERAL NOTES:

DESIGN BASED UPON NCHRP REPORT 350 TEST LEVEL 3 (TL-3).

THE THRIE BEAM RAIL FOR THE BRIDGE ANCHOR SECTION SHALL BE 12 GAGE OR 10 GAGE AT THE CONTRACTOR'S OPTION, AND THE TRANSITION SECTION SHALL BE 12 GAGE.

FABRICATED STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.

FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SEC 1040 OF THE STANDARD SPECIFICATIONS.

RAIL POSTS SHALL BE SET PERPENDICULAR TO THE ROADWAY PROFILE GRADE AND VERTICALLY IN CROSS SECTION.

WASHERS SHALL BE USED AT ALL POST BOLTS.

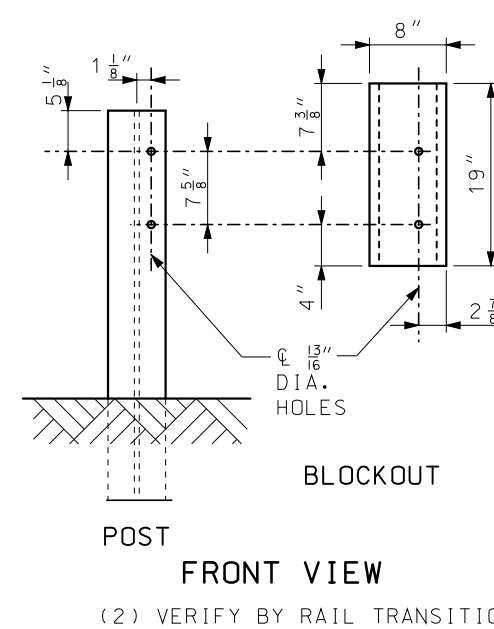
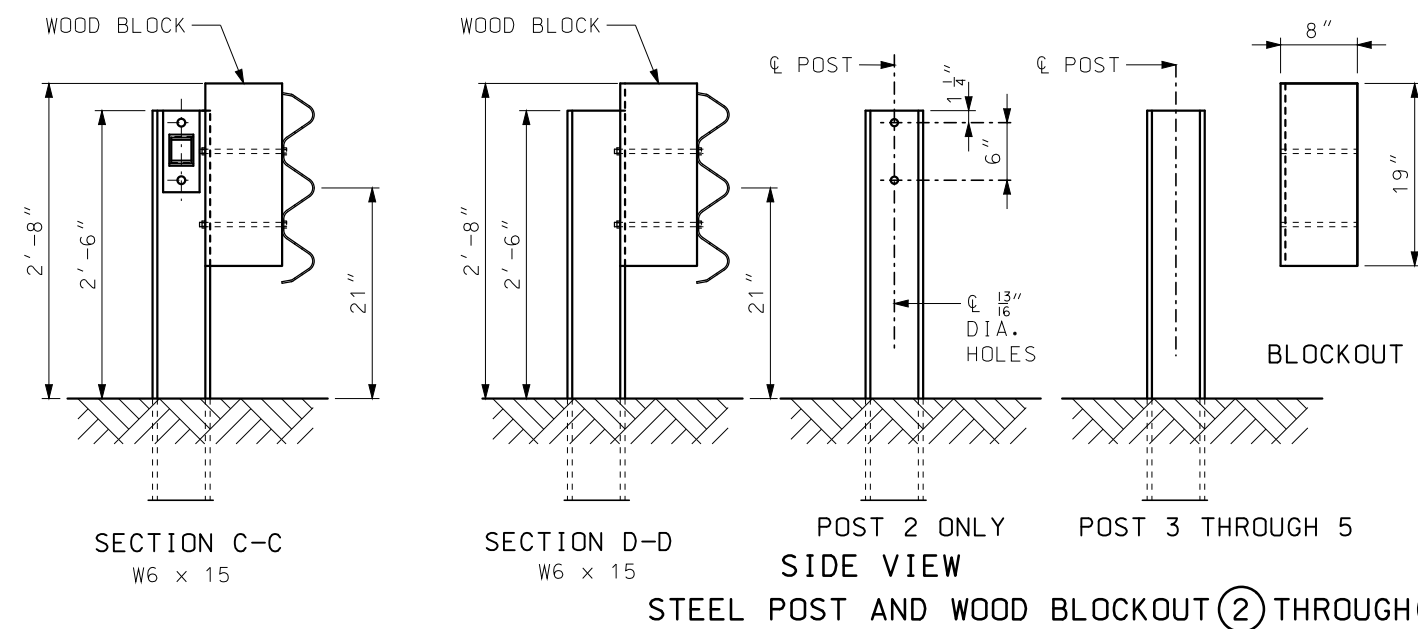
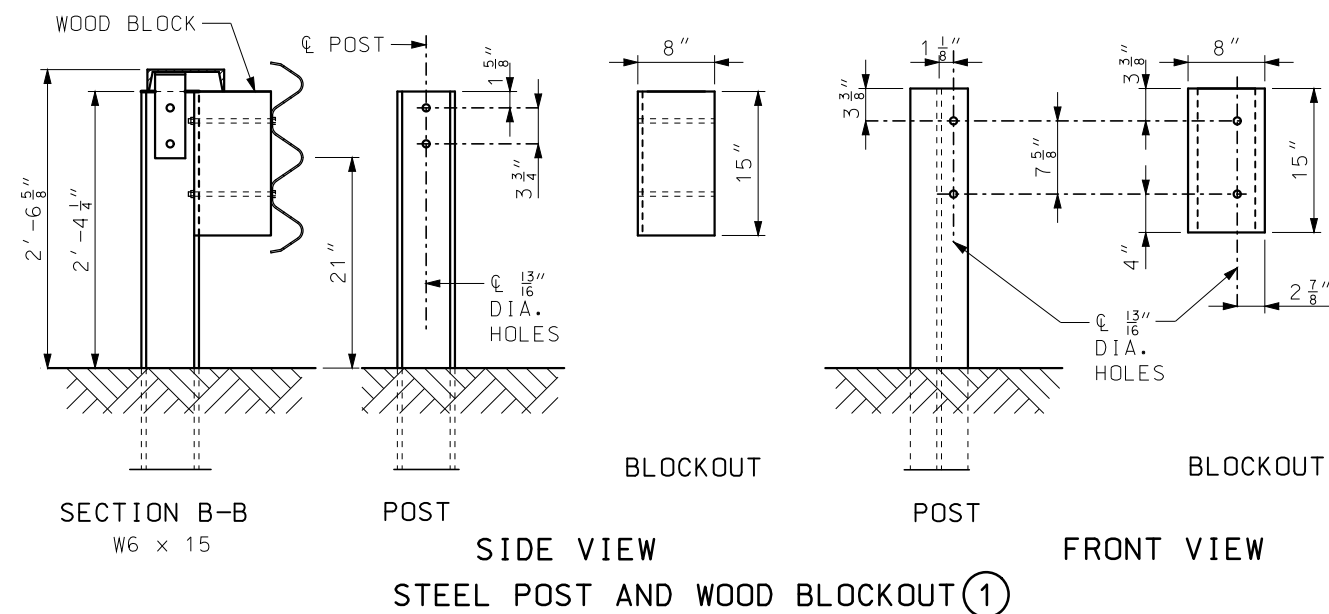
USE 5/8" BUTTON-HEAD, OVAL SHOULDER BOLTS WITH HEX NUTS (THICKNESS OF HEX NUTS = 3/8" MIN.) AT ALL SLOTS.

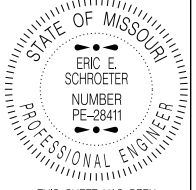
ALL LAP SPLICES SHALL BE MADE IN THE DIRECTION OF TRAFFIC.

THE COST OF FURNISHING, FABRICATING AND INSTALLING TRANSITION SECTION, COMPLETE-IN-PLACE, SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

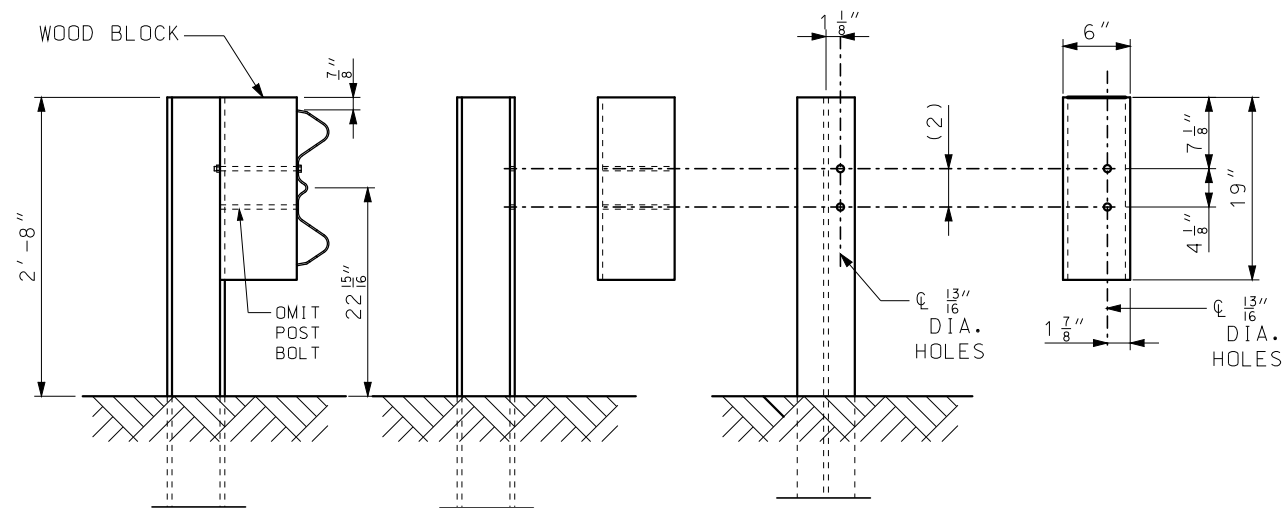
THE COST OF FURNISHING, FABRICATING AND INSTALLING BRIDGE ANCHOR SECTION (THRIE BEAM), COMPLETE-IN-PLACE, SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

FOR DETAILS NOT SHOWN, SEE BRIDGE THRIE BEAM RAIL SHEET.

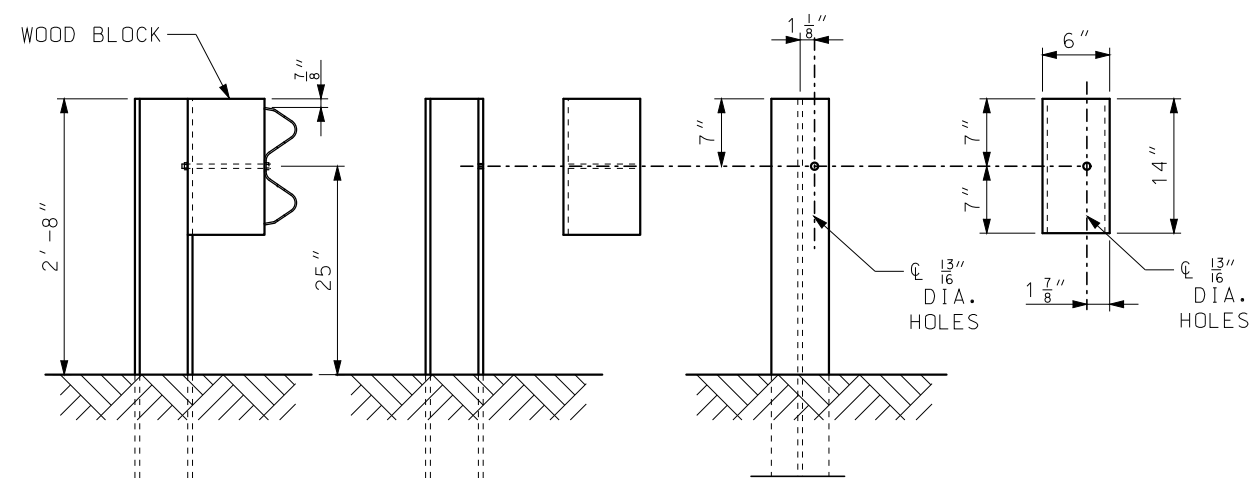


|                                                                                                                                                                                                                                  |                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                             |
|                                                                                                                                             | <b>BRIDGE ANCHOR SECTION</b><br>(THRIE BEAM RAIL ON BRIDGE) |
| DATE EFFECTIVE: 07/01/2016<br>DATE PREPARED: 5/13/2016                                                                                                                                                                           | SHEET NO.<br><b>606.23J</b><br>2 OF 5                       |

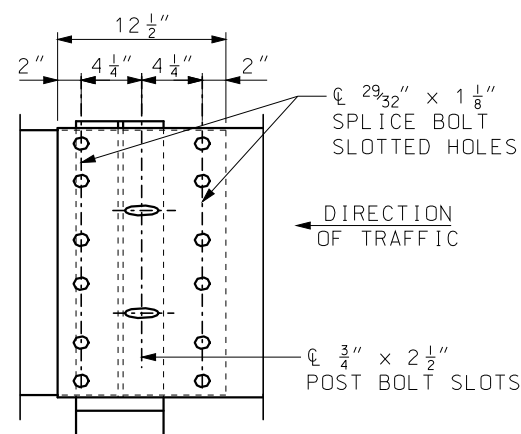
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



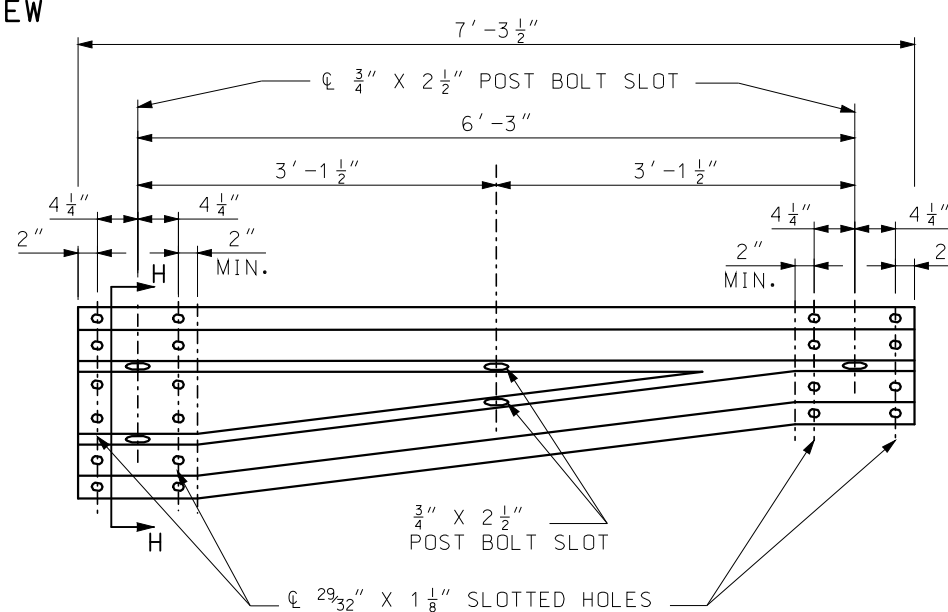
SECTION F-F SIDE VIEW FRONT VIEW  
STEEL POST AND WOOD BLOCKOUT (7)



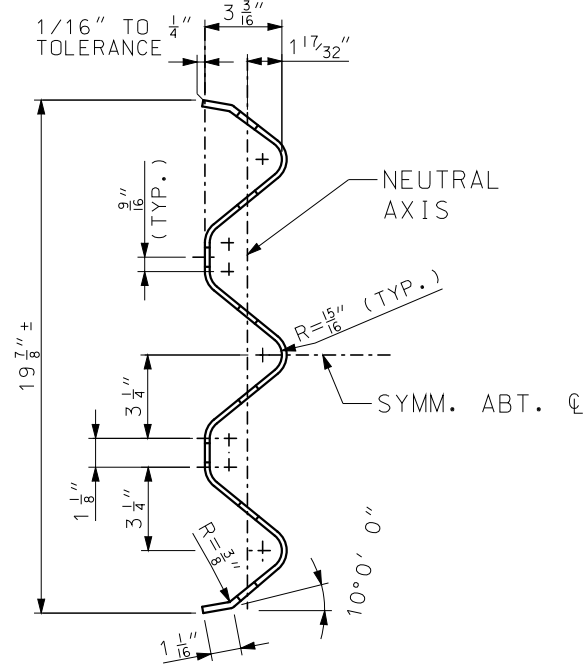
SECTION G-G SIDE VIEW FRONT VIEW  
STEEL POST AND WOOD BLOCKOUT (8)



THRIE BEAM RAIL SPLICE AT POST

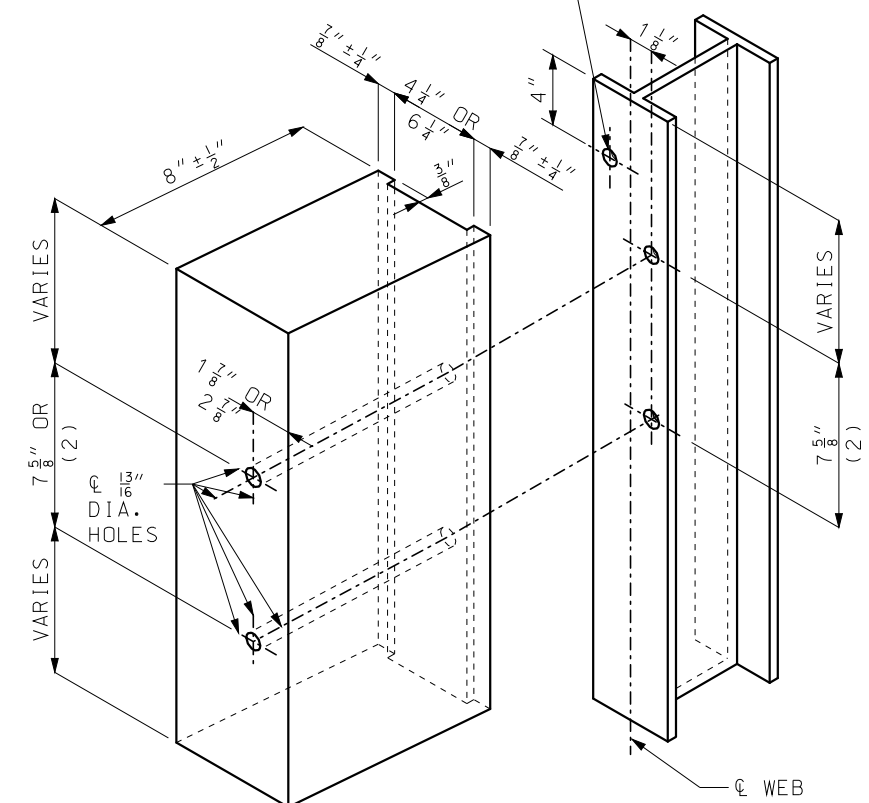


ASYMMETRICAL TRANSITION SECTION



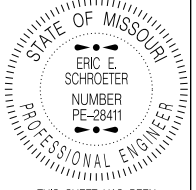
SECTION H-H  
THROUGH THRIE BEAM RAIL

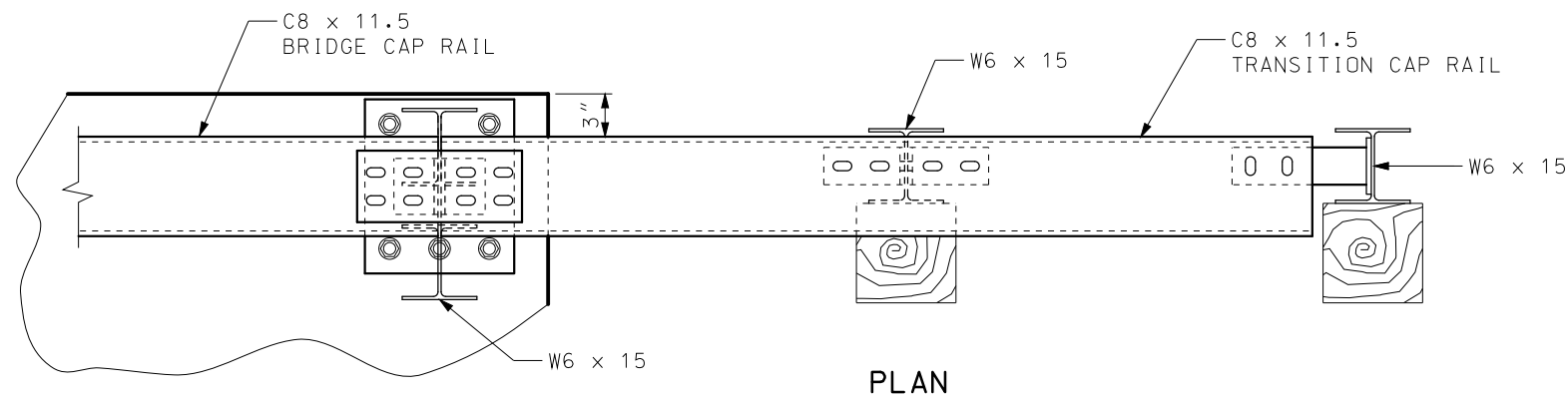
OPTIONAL 13/16" DIA. HOLE FOR HANDLING DURING GALVANIZING. (ONE PERMITTED)



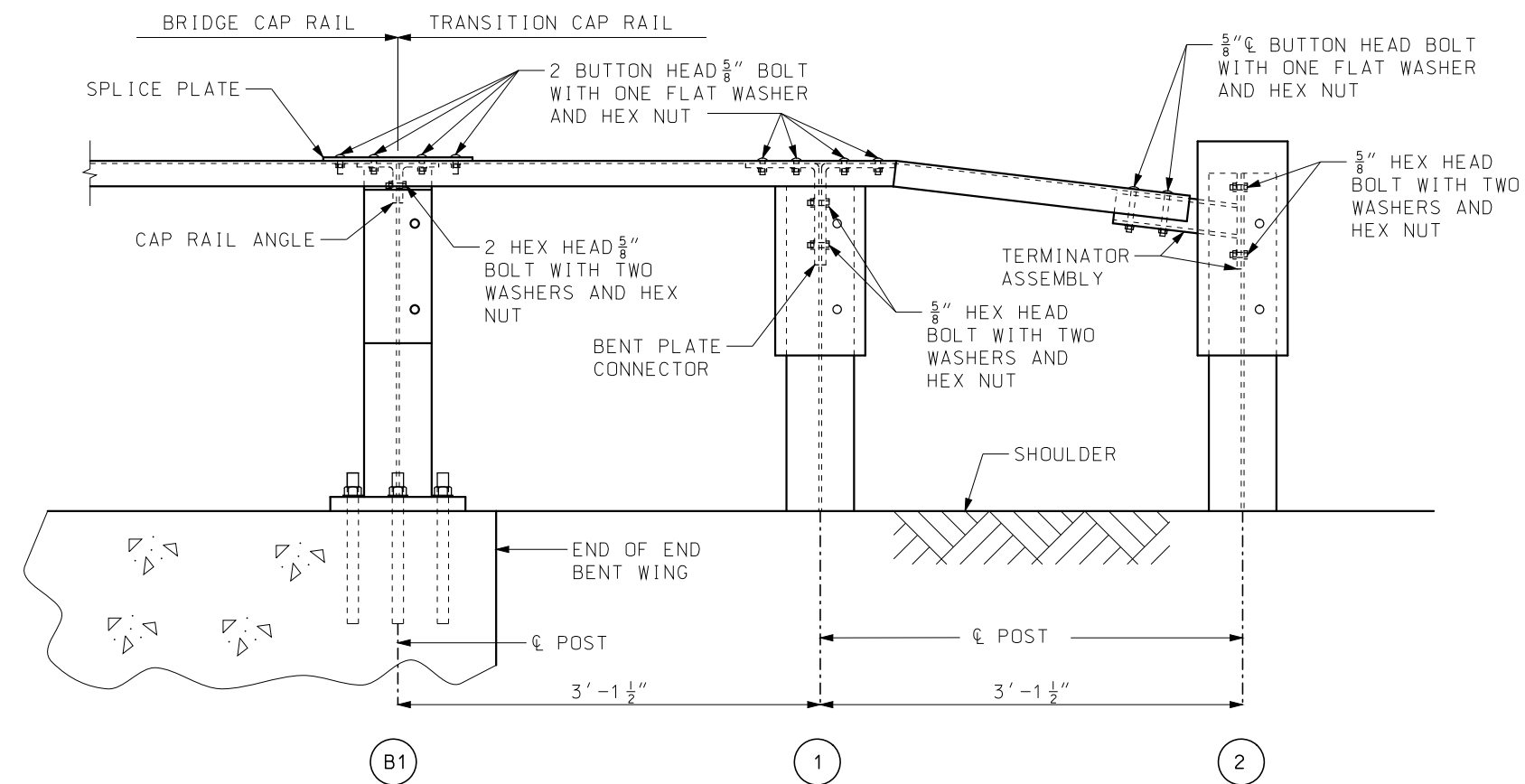
POST (7) - (2) VERIFY BY RAIL TRANSITION PRODUCER (SEE FRONT SHEET)  
POST (8) - ONLY 1 HOLE REQUIRED  
ALL HOLES 13/16" DIAMETER EXCEPT AS NOTED

HOLE PUNCHING DETAIL  
FOR STEEL POST & WOOD BLOCKS (6" AND 8")

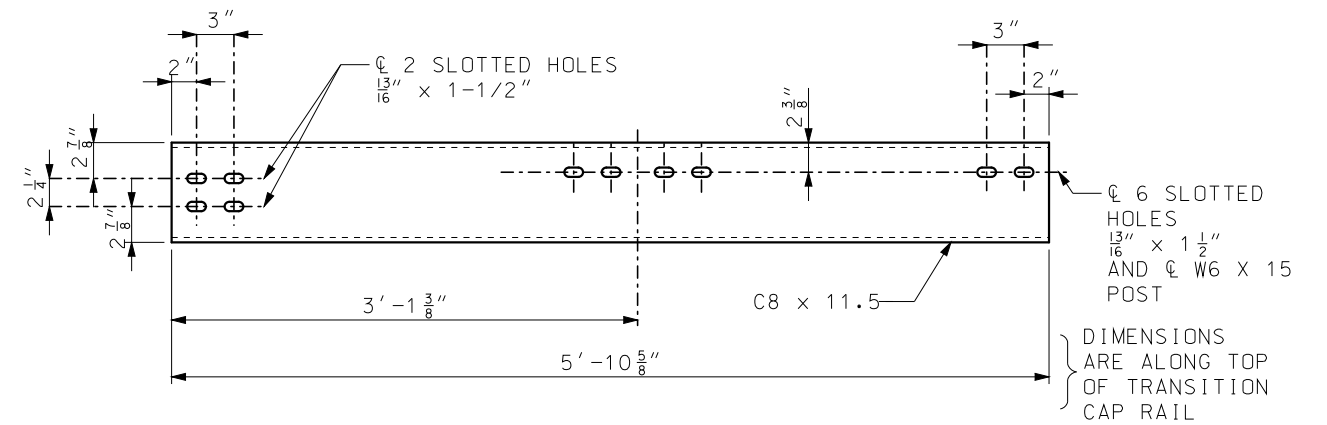
|                                                                                                                                                                                                                                  |                                                             |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                             |                     |
|                                                                                                                                             | <b>BRIDGE ANCHOR SECTION</b><br>(THRIE BEAM RAIL ON BRIDGE) |                     |
| DATE EFFECTIVE: 07/01/2016<br>DATE PREPARED: 5/13/2016                                                                                                                                                                           | 606.23J                                                     | SHEET NO.<br>3 OF 5 |



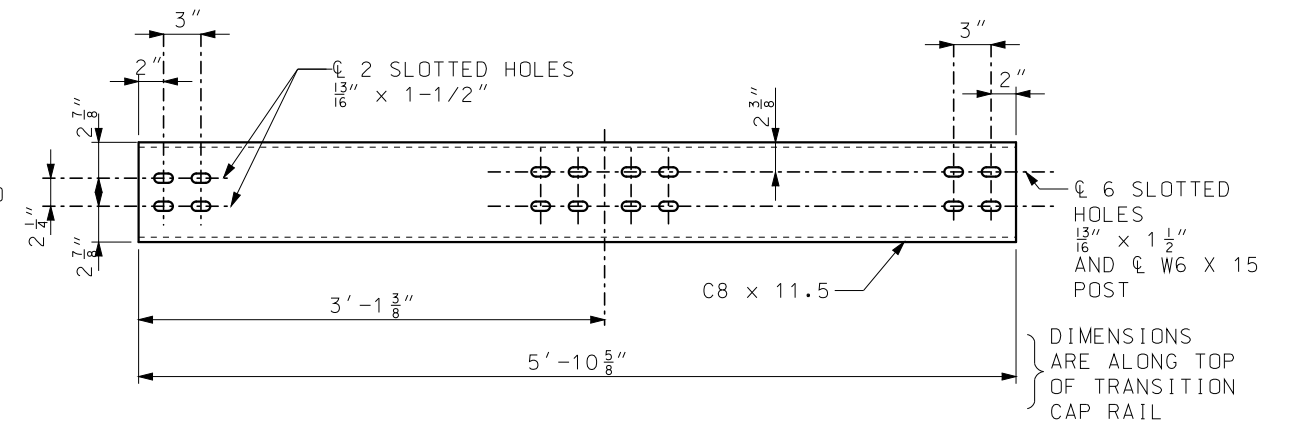
## PLAN



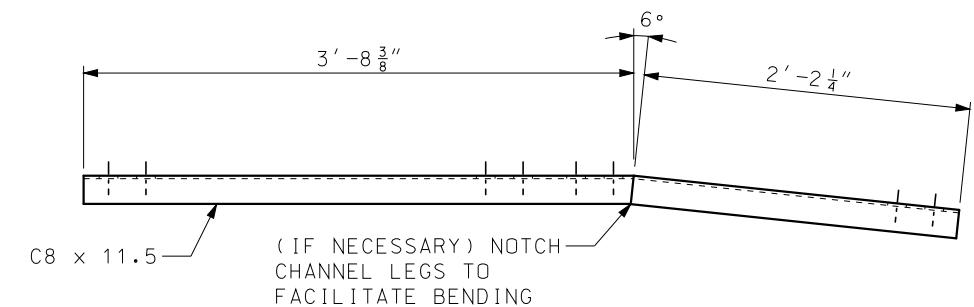
ELEVATION  
(THRIE BEAM RAIL NOT SHOWN)



TOP VIEW (ALTERNATE 1)



TOP VIEW (ALTERNATE 2)



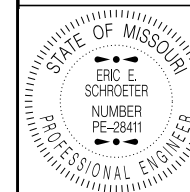
ELEVATION  
TRANSITION CAP RAIL

GENERAL NOTES:



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

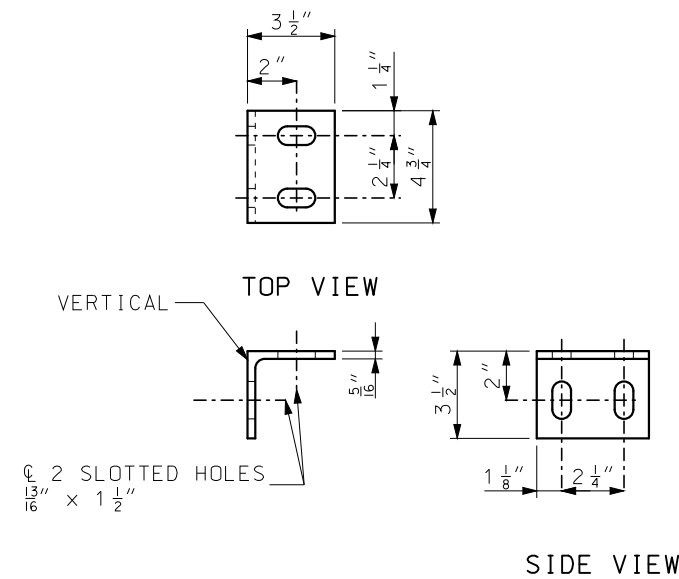
BRIDGE ANCHOR SECTION  
(THRIE BEAM RAIL ON BRIDGE)

DATE EFFECTIVE: 07/01/2016  
DATE PREPARED: 5/13/2016

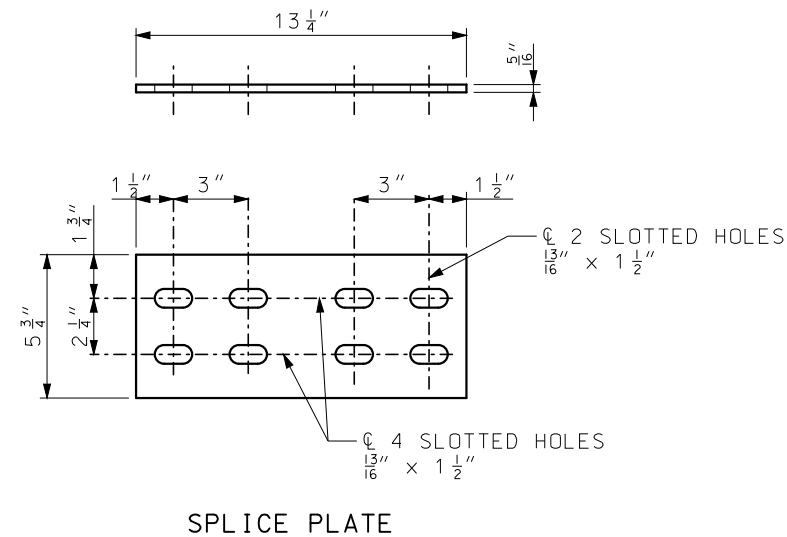
606.23J

SHEET NO.  
4 OF 5

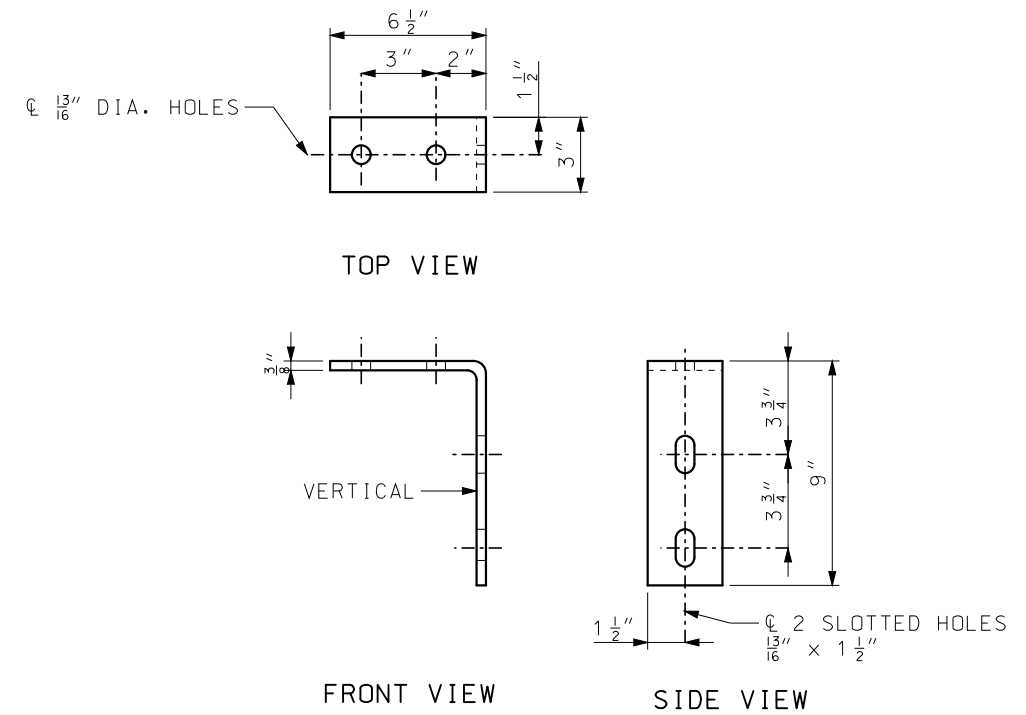
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



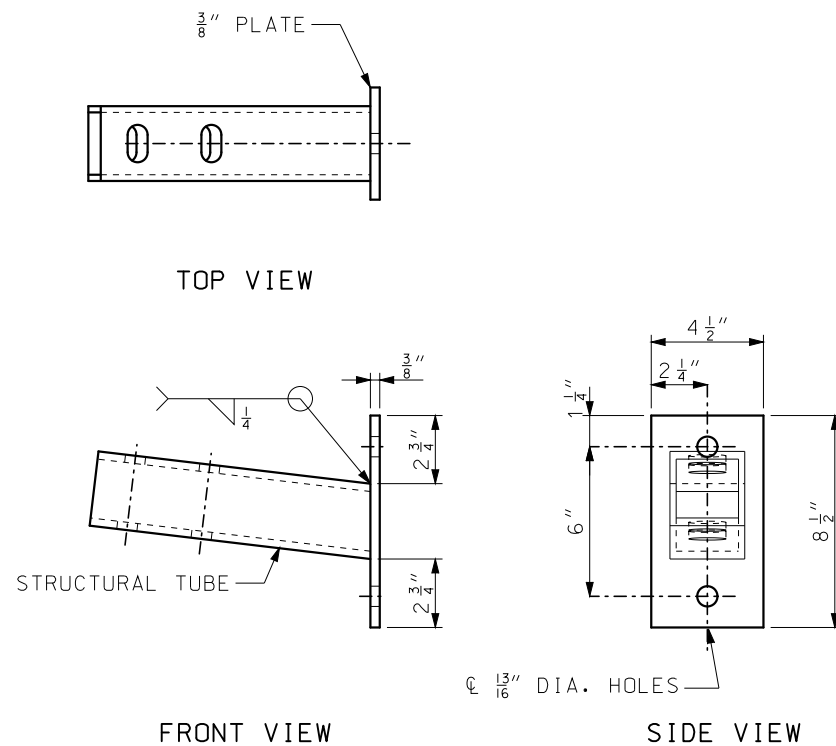
CAP RAIL ANGLE  
 $\angle 3\frac{1}{2}'' \times 3\frac{1}{2}'' \times \frac{5}{16}''$



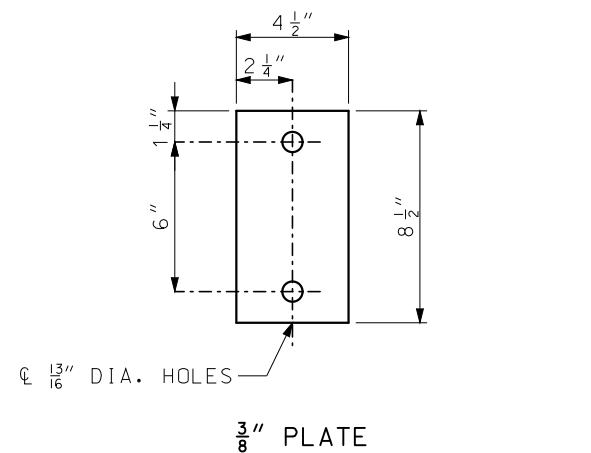
SPLICE PLATE



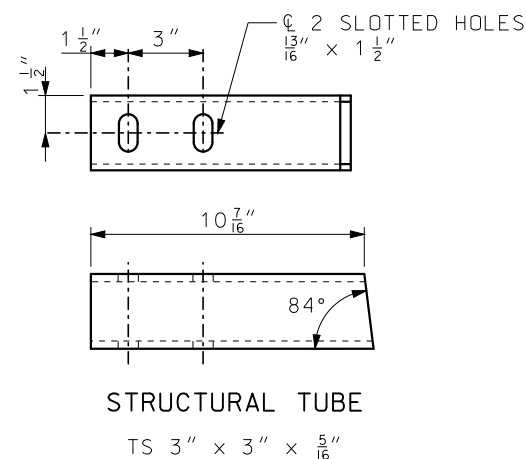
BENT PLATE CONNECTOR



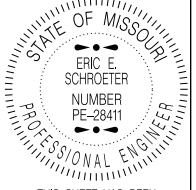
TERMINATOR ASSEMBLY



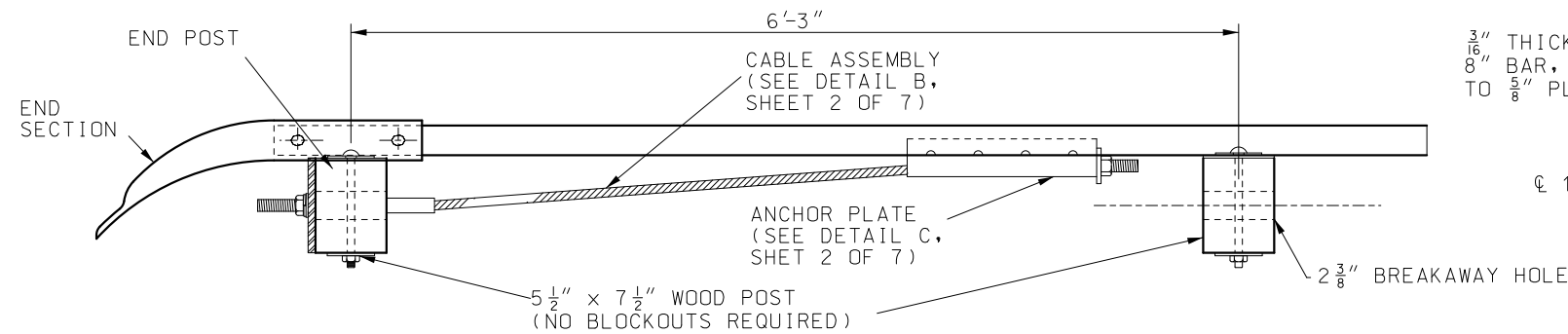
$\frac{3}{8}''$  PLATE



STRUCTURAL TUBE  
 TS  $3'' \times 3'' \times \frac{5}{16}''$

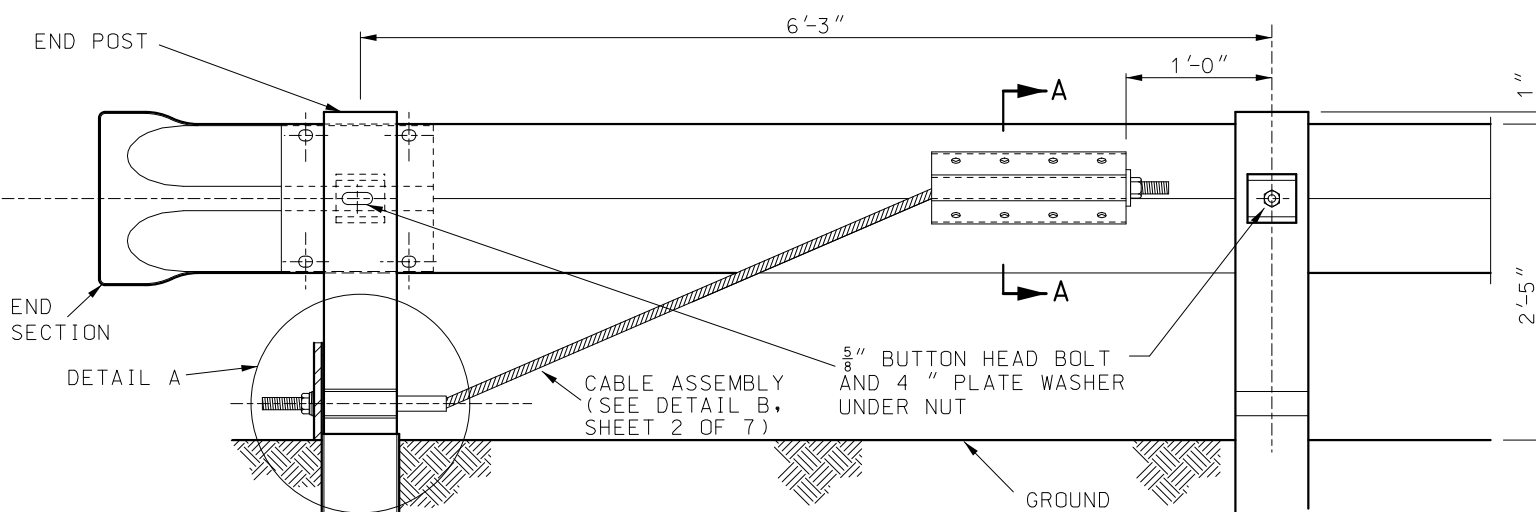
|                                                                                                                                                                                                                                  |                                                             |                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                             |                            |
|                                                                                                                                             | <b>BRIDGE ANCHOR SECTION</b><br>(THRIE BEAM RAIL ON BRIDGE) |                            |
| DATE EFFECTIVE: 07/01/2016<br>DATE PREPARED: 5/13/2016                                                                                                                                                                           | <b>606.23J</b>                                              | SHEET NO.<br><b>5 OF 5</b> |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



NOTE: FOR DETAILS OF END SECTION,  
SEE STD PLANS 606.00.

PLAN



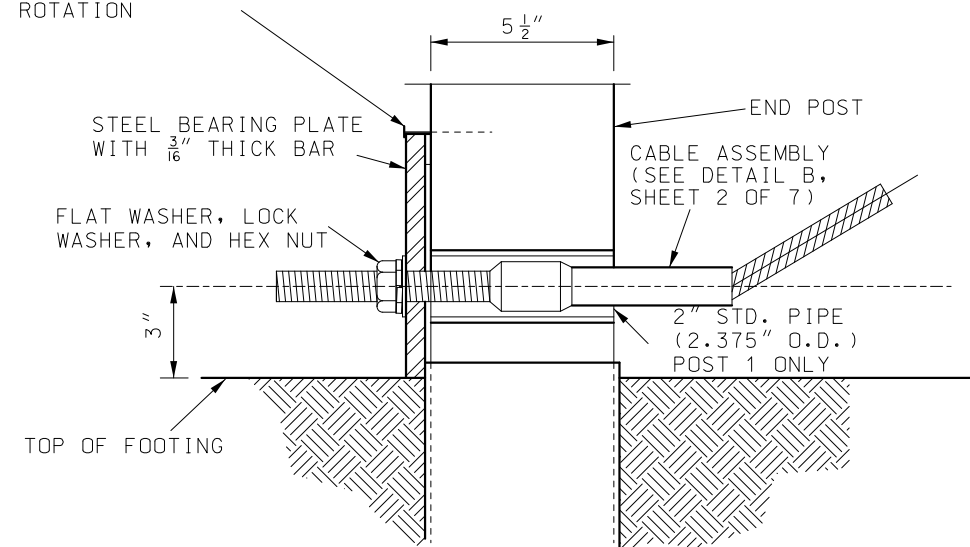
POST 1

ELEVATION  
(BACK SIDE)

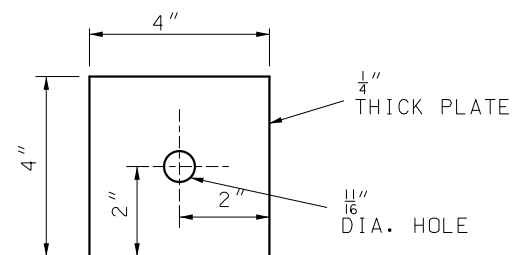
POST 2

END ANCHOR DETAILS

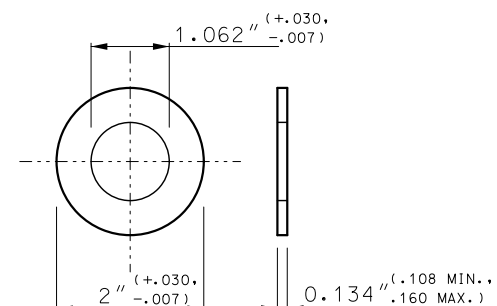
TWO 8D GALV. NAILS  
TO PREVENT PLATE  
ROTATION



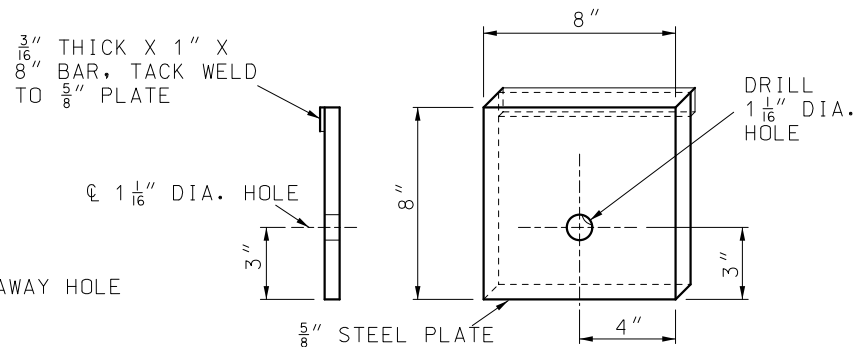
DETAIL A  
(END POST DETAIL)



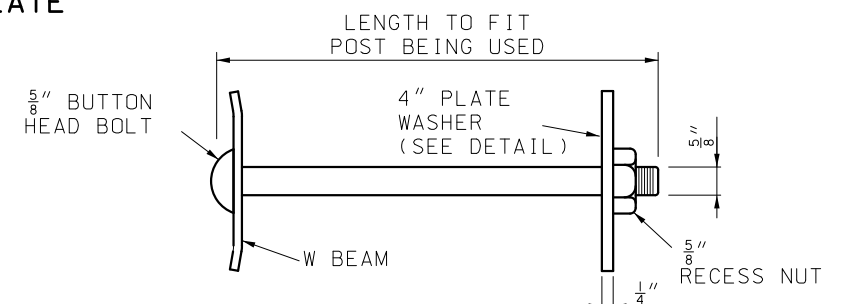
4" PLATE WASHER



TYPE A WASHER



DETAIL OF  
STEEL BEARING PLATE



POST BOLT ASSEMBLY

GENERAL NOTES:

END ANCHOR DETAILS SHOWN SHALL BE USED ONLY ON  
DOWN STREAM ENDS OF GUARDRAIL WHEN AN END ANCHOR  
IS REQUIRED.

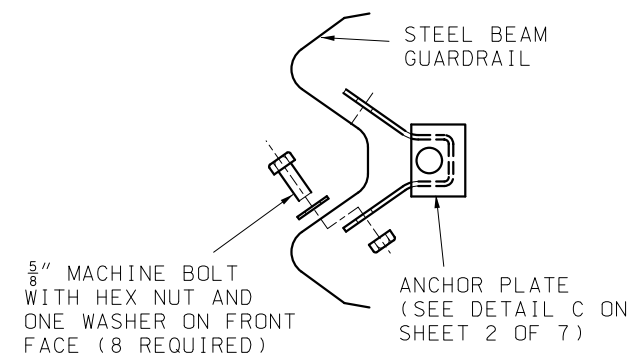
THE DETAILS SHOWN ARE FOR AN END ANCHORAGE SYSTEM  
FOR GUARDRAIL. GUARDRAIL AND POSTS ARE PAID FOR  
SEPARATELY.

CABLE ASSEMBLY AND ANCHOR PLATE SHALL BE SUBJECT TO  
APPROVAL BY THE ENGINEER AND SHALL HAVE A MINIMUM  
BREAKING STRENGTH OF 20 TONS.

ALL FITTINGS AND HARDWARE REQUIRED SHALL BE  
GALVANIZED AFTER FABRICATION, SEE SECTION 1040  
STANDARD SPECIFICATION.

WOOD POSTS 1 AND 2 SHALL BE 5 1/2" X 7 1/2".

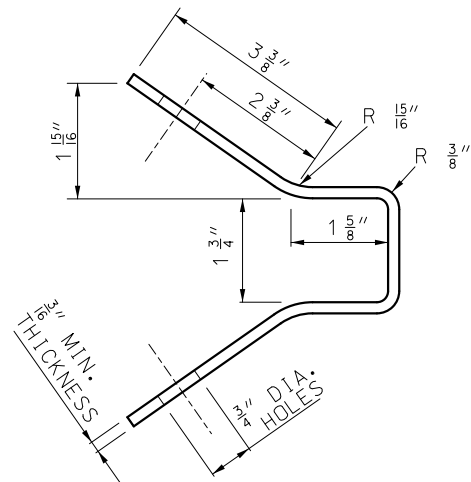
SEE SHEET 3 FOR WOOD POST DETAILS.



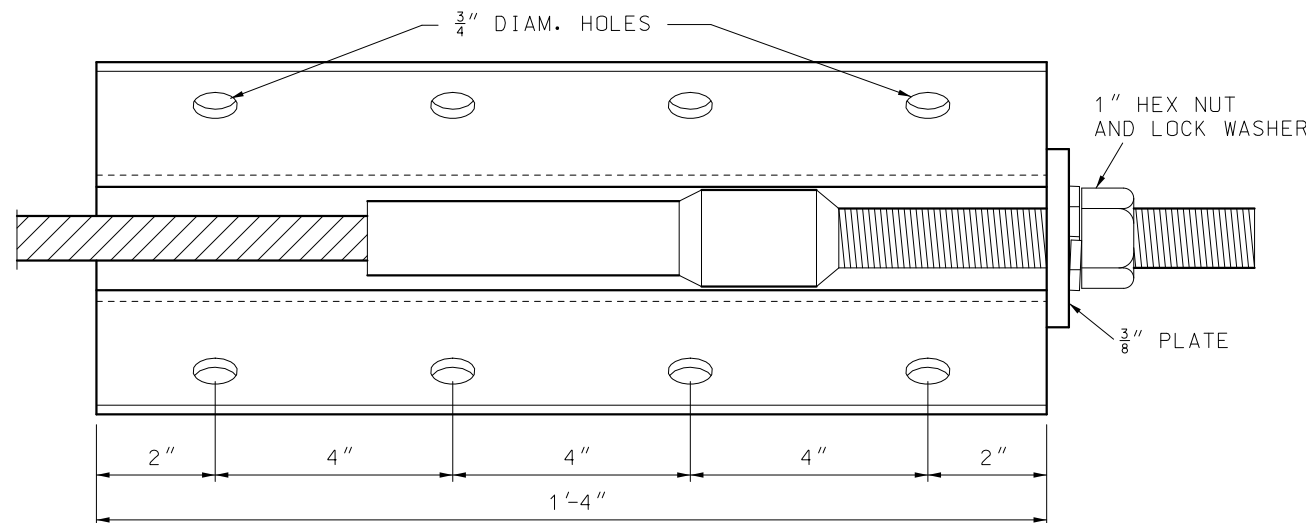
SECTION A-A

|                                                                                                                                                                           |                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                   |                                                  |
| <p>STATE OF MISSOURI<br/>TRAVIS D. KOESTNER<br/>NUMBER PE-30042<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p><b>GUARDRAIL<br/>TERMINAL ANCHOR ENDS</b></p> |
| <p>DATE EFFECTIVE: 04/01/2021<br/>DATE PREPARED: 1/27/2021</p>                                                                                                            | <p>606.30L</p>                                   |
| <p>SHEET NO.<br/>1 OF 7</p>                                                                                                                                               |                                                  |

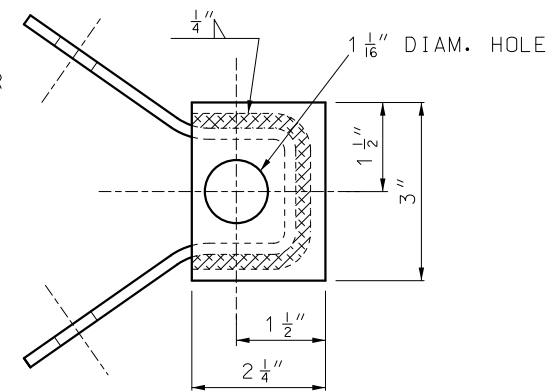
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



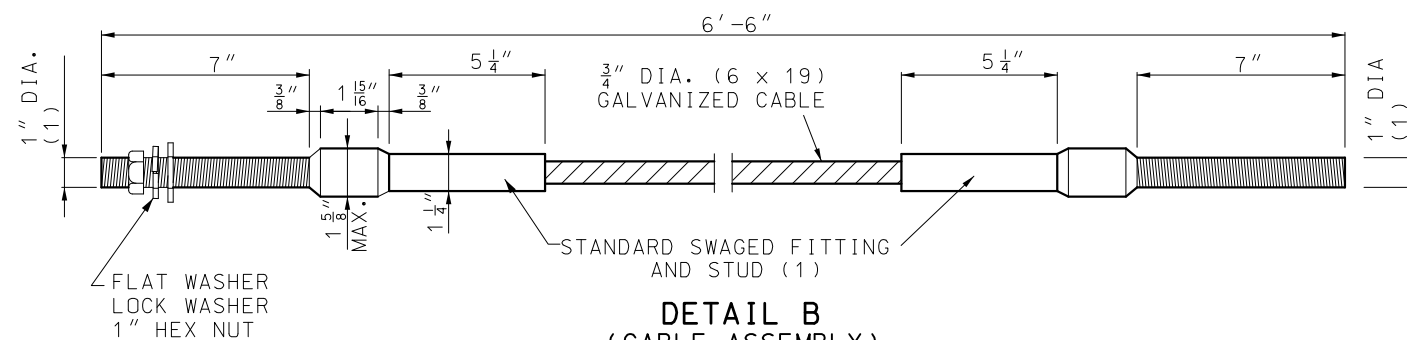
FABRICATION DETAIL



DETAIL C  
ASSEMBLED VIEW  
(ANCHOR PLATE)

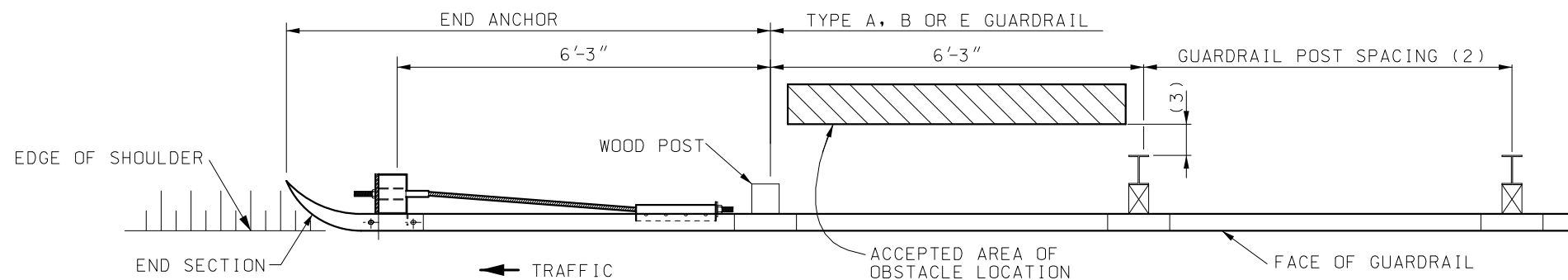


END VIEW

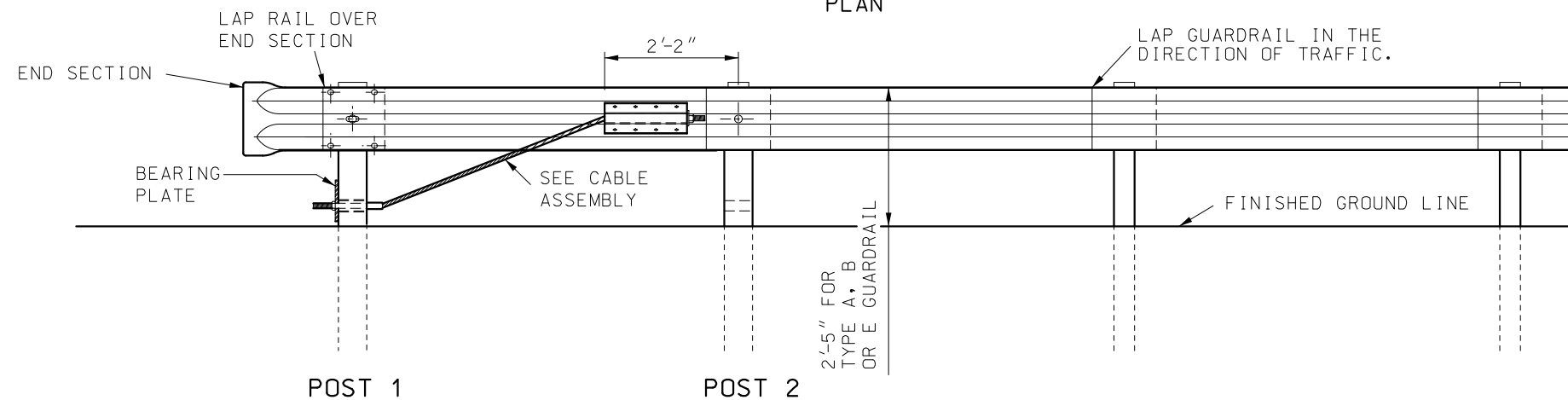


DETAIL B  
(CABLE ASSEMBLY)

- (1) STUD, THREADED ENTIRE LENGTH.
- (2) 6'-3" SPACING FOR TYPE A OR B GUARDRAIL; 3'-1 1/2" SPACING FOR TYPE E GUARDRAIL.
- (3) 27" MINIMUM BUT LESS THAN 4' FOR TYPE E GUARDRAIL; 4' MINIMUM FOR TYPE A GUARDRAIL.



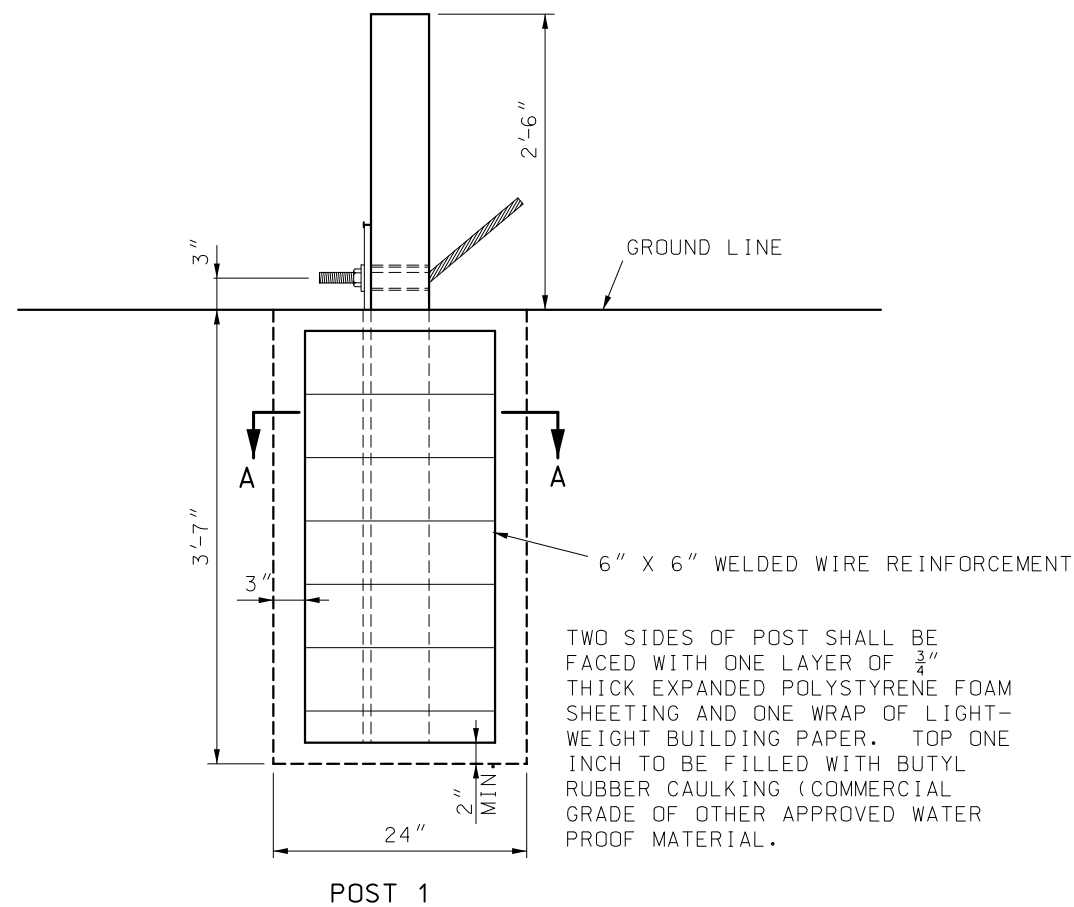
PLAN



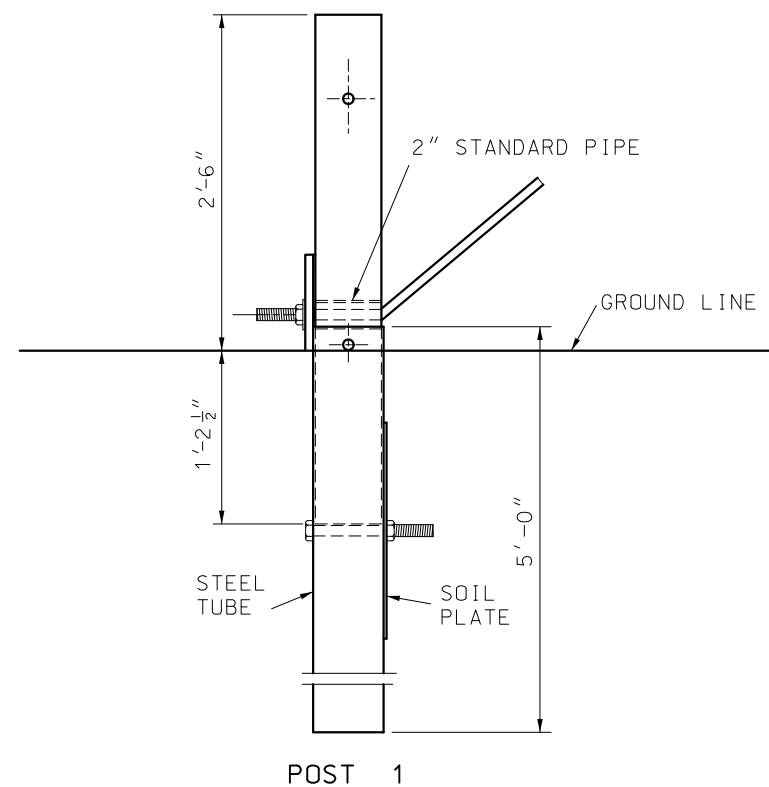
ELEVATION  
END ANCHOR

|                                                                                                                                                                                                                                  |                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                 |
|                                                                                                                                             | <b>GUARDRAIL</b><br><b>TERMINAL ANCHOR ENDS</b> |
| DATE EFFECTIVE: 04/01/2021<br>DATE PREPARED: 1/27/2021                                                                                                                                                                           | SHEET NO.<br><b>606.30L</b><br><b>2 OF 7</b>    |



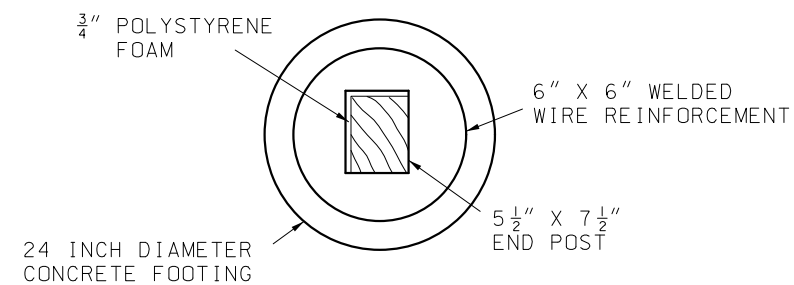


## CONCRETE FOUNDATION FOR END ANCHORS

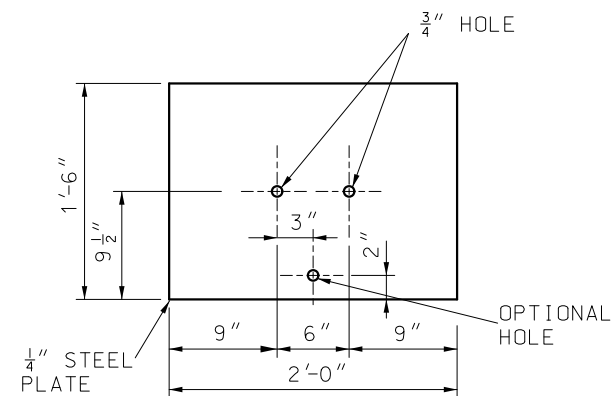


## STEEL TUBE FOUNDATION FOR END ANCHORS

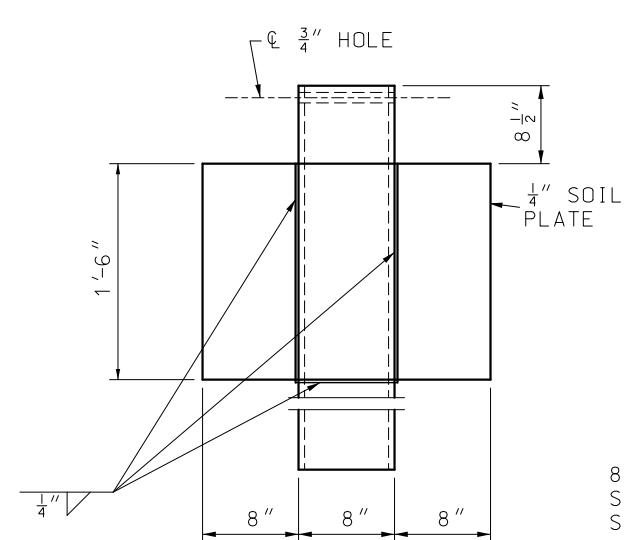
BOLTS AND NUTS SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1080 OF THE MISSOURI STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.



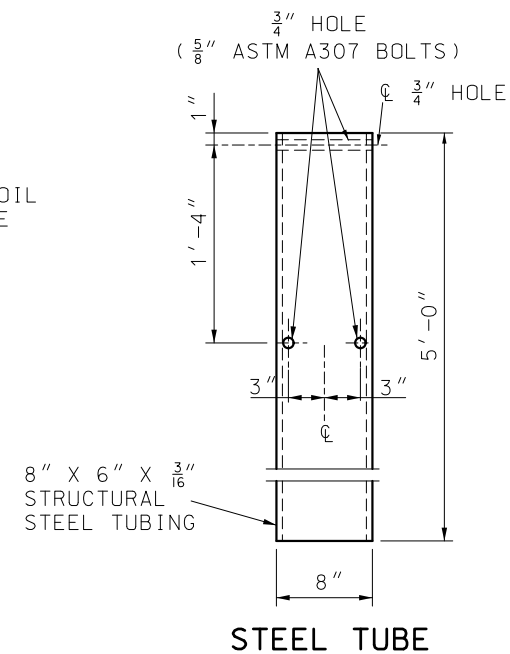
SECTION A-A  
EXPANDED POLYSTYRENE FOAM  
INSTALLATION DETAIL



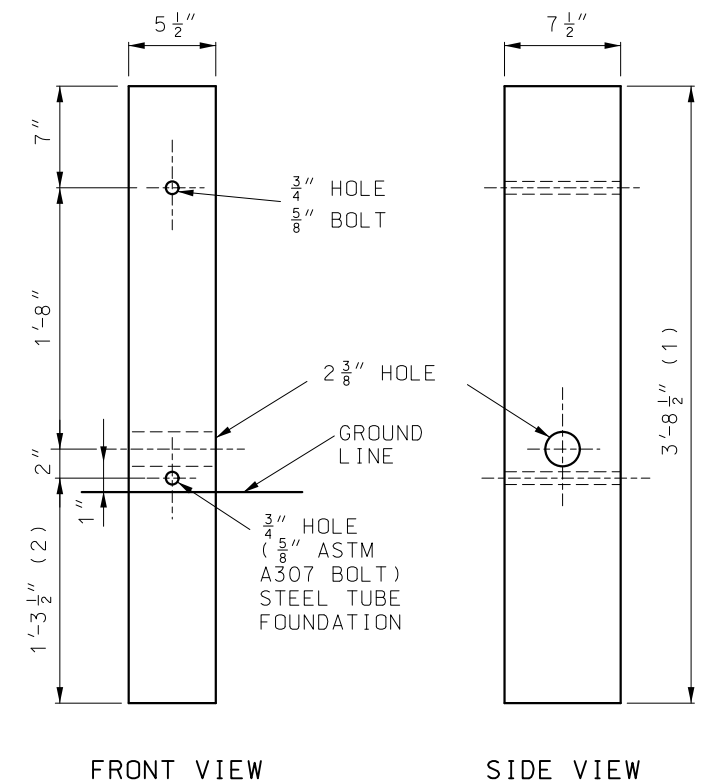
SOIL PLATE



SHOP WELDED  
SOIL PLATE CONNECTION



## STEEL TUBE



WOOD BREAKAWAY POST  
SEE SECTION 1050

- (1) 5'-11 $\frac{1}{2}$ " FOR CONCRETE FOUNDATION ALTERNATE.
- (2) 3'-8 $\frac{1}{2}$ " FOR CONCRETE FOUNDATION ALTERNATE.

GENERAL NOTES:

THE CONTRACTOR HAS THE OPTION TO INSTALL WOOD POST 1 AND 2 IN STEEL TUBE OR CONCRETE FOUNDATION.

TRIMMING OF WOOD POST MAY BE NECESSARY FOR STEEL  
TUBE FOUNDATION.

STEEL TUBE FOUNDATIONS SHALL BE DRILLED AND BACK-FILLED WITH A SUITABLE MATERIAL WHEN THE SOIL PLATE IS BOLTED, AS SHOWN, TO THE STEEL TUBE. STEEL TUBE FOUNDATION MAY BE DRIVEN WHEN THE SOIL PLATE IS WELDED, AS SHOWN, TO THE STEEL TUBE.

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

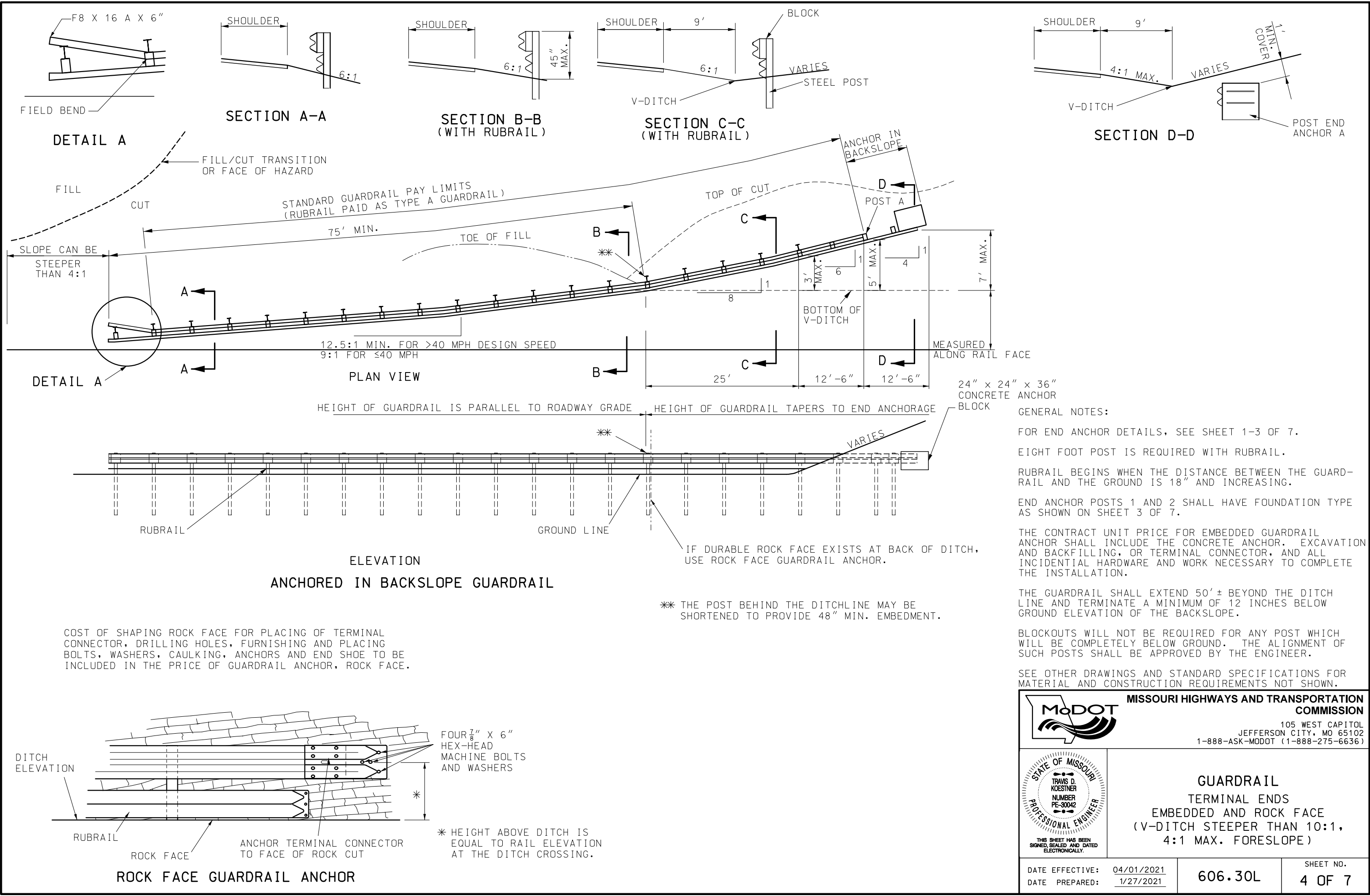


GUARDRAIL  
TERMINAL ANCHOR ENDS

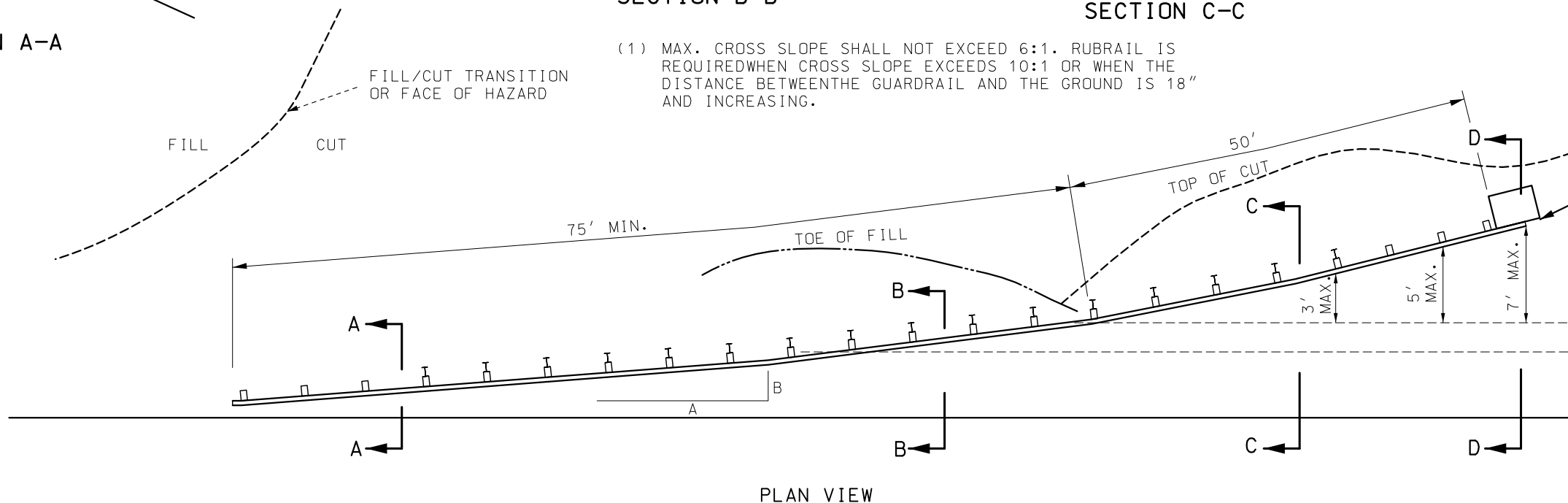
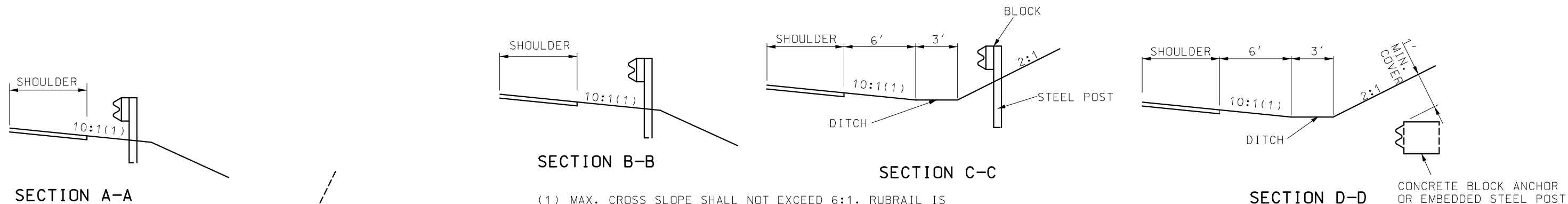
DATE EFFECTIVE: 04/01/2021  
DATE PREPARED: 1/27/2021

606.30L

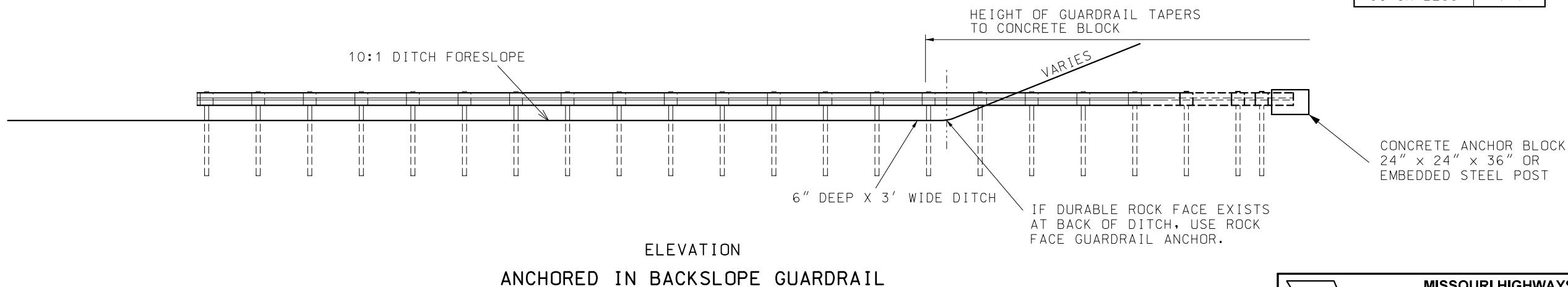
SHEET NO.  
3 OF 7



IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| 10:1 CROSS SLOPE    |      | STEEPER THAN 10:1 CROSS SLOPE (1) |        |
|---------------------|------|-----------------------------------|--------|
| DESIGN SPEED<br>mph | A:B  | DESIGN SPEED<br>mph               | A:B    |
| 70                  | 15:1 | 45-70                             | 12.5:1 |
| 60                  | 13:1 | 40                                | 9:1    |
| 55                  | 12:1 | 30 OR LESS                        | 7:1    |
| 50                  | 11:1 |                                   |        |
| 45                  | 10:1 |                                   |        |
| 40                  | 9:1  |                                   |        |
| 30 OR LESS          | 7:1  |                                   |        |



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**GUARDRAIL  
EMBEDDED TERMINAL  
ENDS (FLAT DITCH)**

DATE EFFECTIVE: 04/01/2021  
DATE PREPARED: 1/27/2021

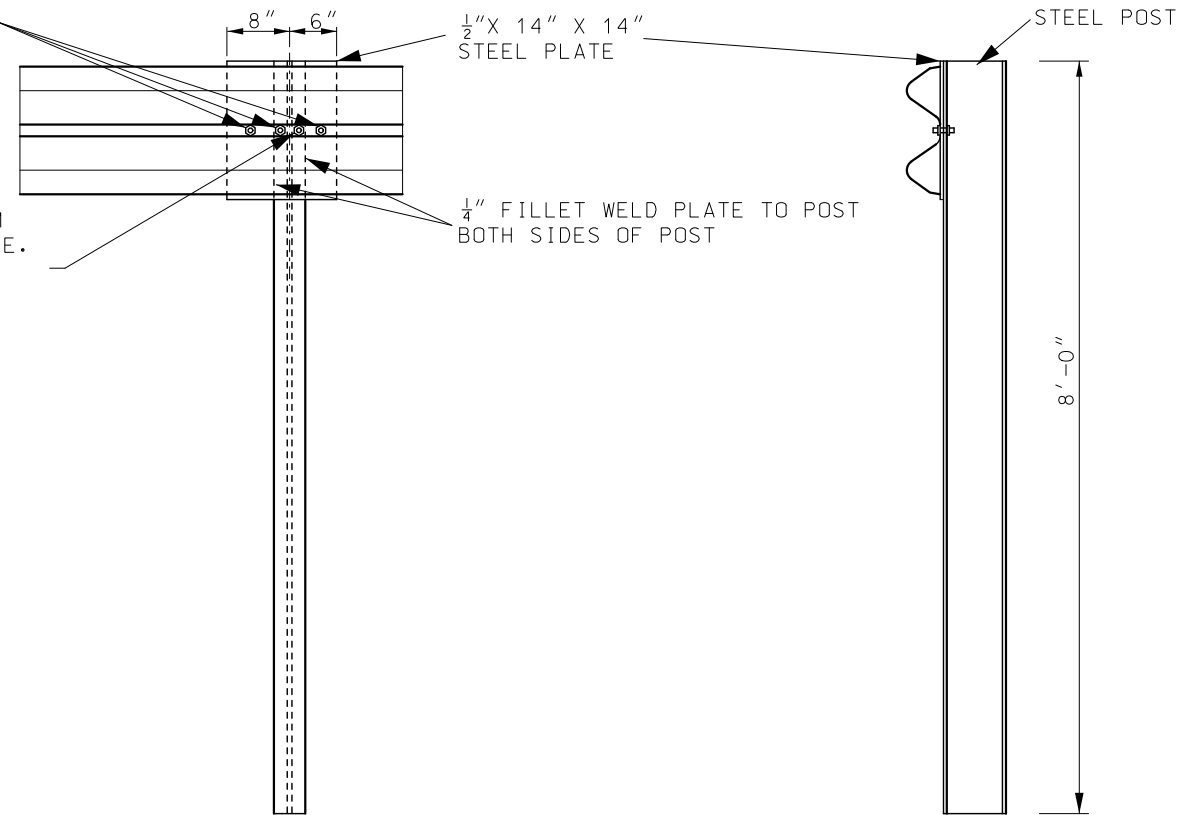
**606.30L**

SHEET NO.  
**5 OF 7**

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

3 - 1" Ø HOLES TO BE FIELD DRILLED IN W-BEAM ELEMENT AND ATTACHED WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLTS  $1\frac{7}{16}$ " LONG EACH WITH ONE SQUARE WASHER AND HEX NUT.

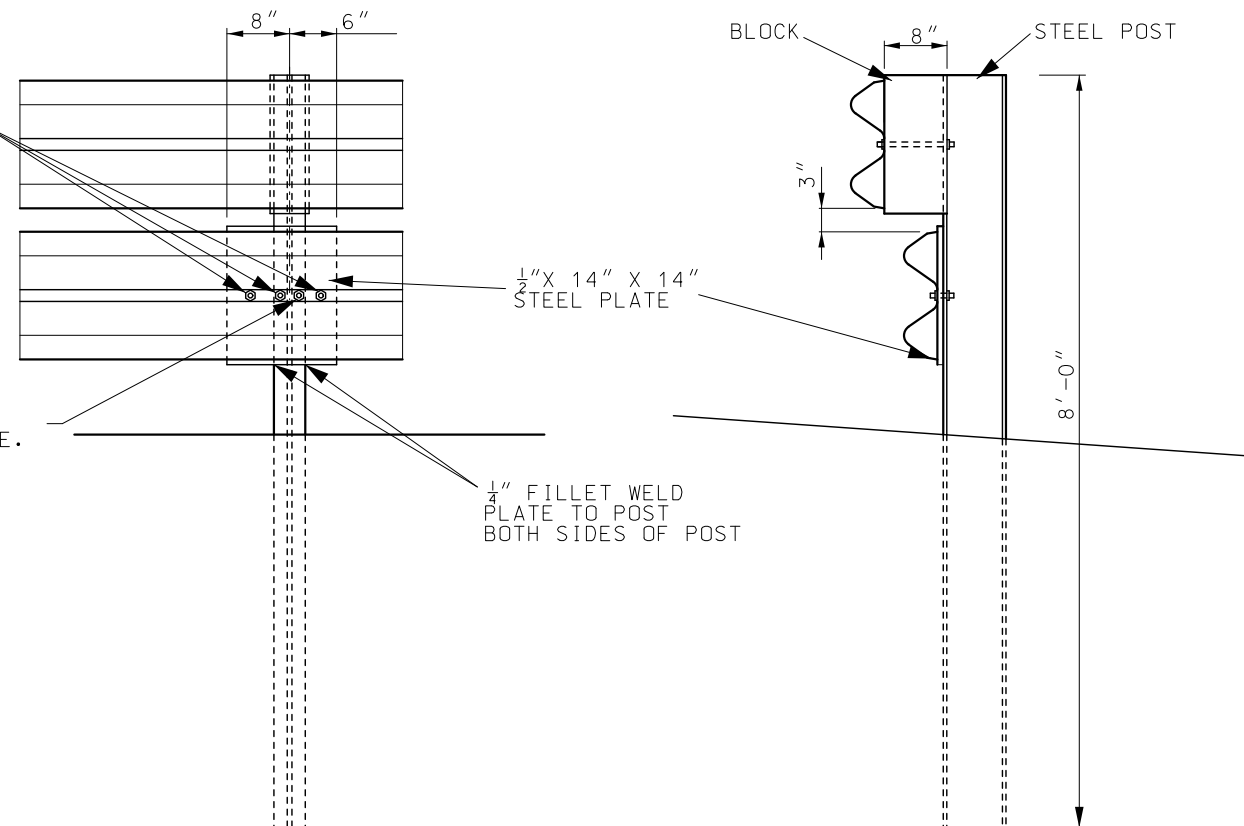
1" Ø HOLE TO BE FIELD DRILLED THROUGH W-BEAM AND THROUGH POST FLANGE. ATTACHED W-BEAM WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLT 2" LONG WITH ONE SQUARE WASHER AND HEX NUT.



EMBEDDED STEEL POST

3 - 1" Ø HOLES TO BE FIELD DRILLED IN W-BEAM ELEMENT AND ATTACHED WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLTS  $1\frac{7}{16}$ " LONG EACH WITH ONE SQUARE WASHER AND HEX NUT.

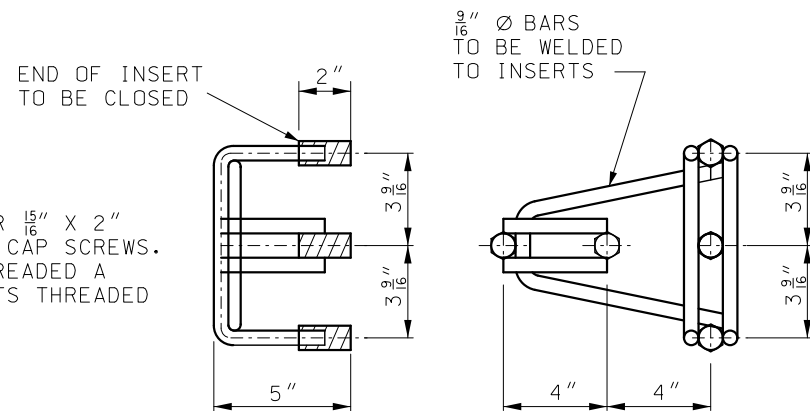
1" Ø HOLE TO BE FIELD DRILLED THROUGH W-BEAM AND THROUGH POST FLANGE. ATTACHED W-BEAM WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLT 2" LONG WITH ONE SQUARE WASHER AND HEX NUT.



SPECIAL RUBRAIL TO POST CONNECTION AT POST A

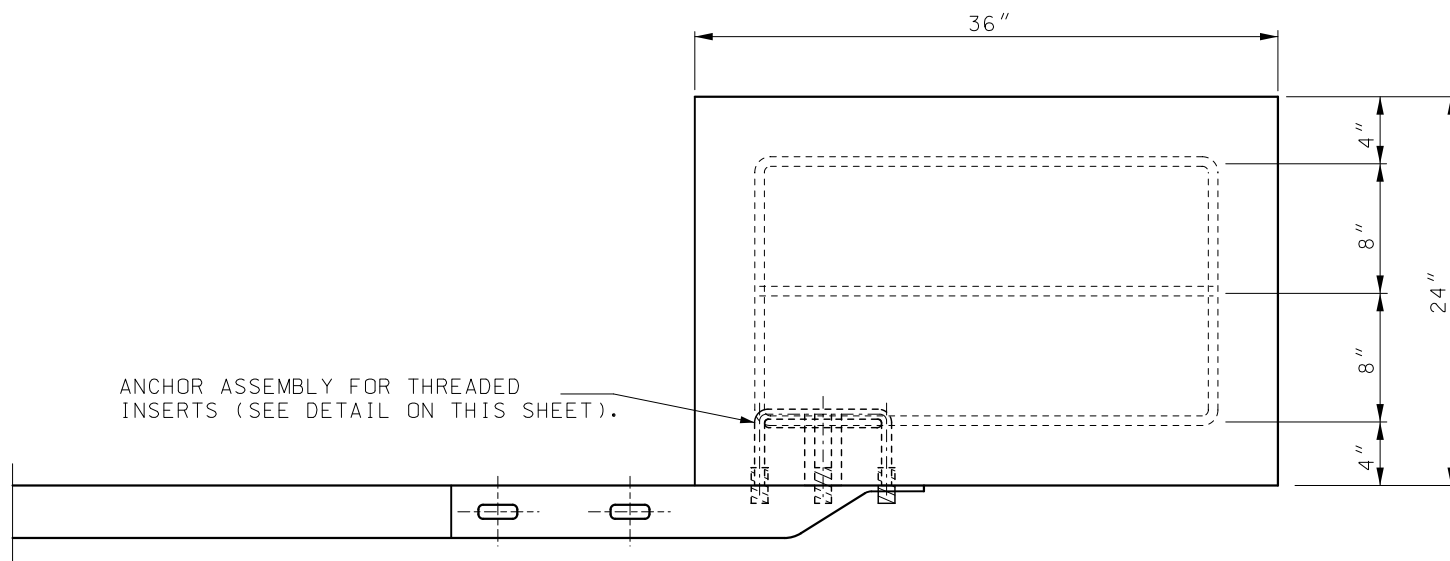
|                                                                                       |            |                                                                                  |                     |
|---------------------------------------------------------------------------------------|------------|----------------------------------------------------------------------------------|---------------------|
|  |            | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |                     |
|                                                                                       |            | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                     |
|  |            | <b>GUARDRAIL</b><br>EMBEDDED ANCHOR TERMINAL ENDS<br>(STEEL POST OPTION)         |                     |
| THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.                          |            |                                                                                  |                     |
| DATE EFFECTIVE:                                                                       | 04/01/2021 | 606.30L                                                                          | SHEET NO.<br>6 OF 7 |
| DATE PREPARED:                                                                        | 1/27/2021  |                                                                                  |                     |

THREADED INSERTS FOR  $\frac{15}{16}$ " X 2" GALVANIZED HEX HEAD CAP SCREWS. CAP SCREWS TO BE THREADED A MINIMUM  $1\frac{7}{8}$ ". INSERTS THREADED MINIMUM OF  $1\frac{3}{4}$ ".



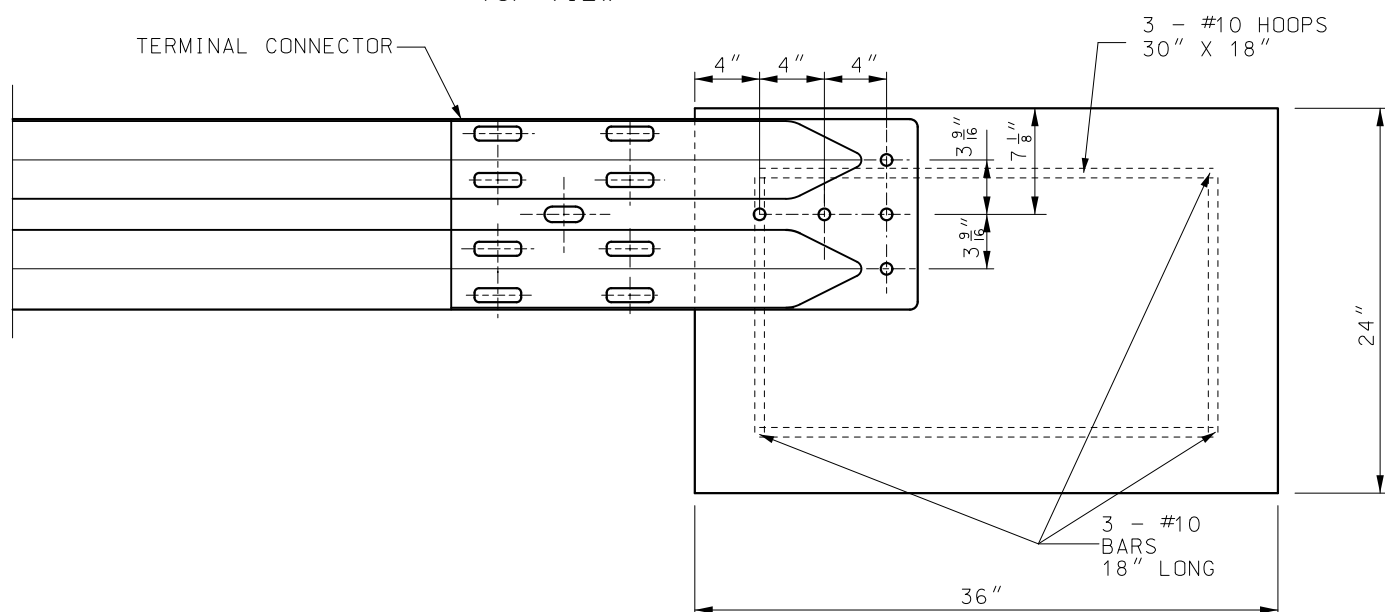
CONCRETE BLOCK ANCHOR ANCHOR ASSEMBLY

ANCHOR ASSEMBLY FOR THREADED INSERTS (SEE DETAIL ON THIS SHEET).

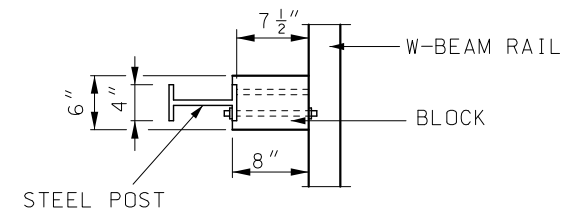


TOP VIEW

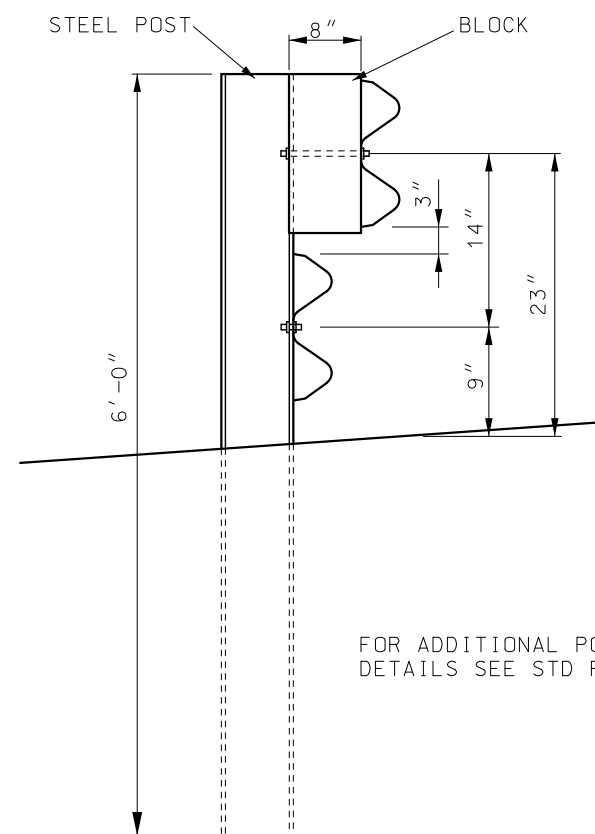
TERMINAL CONNECTOR



ELEVATION  
CONCRETE BLOCK ANCHOR  
(24" X 24" X 36")



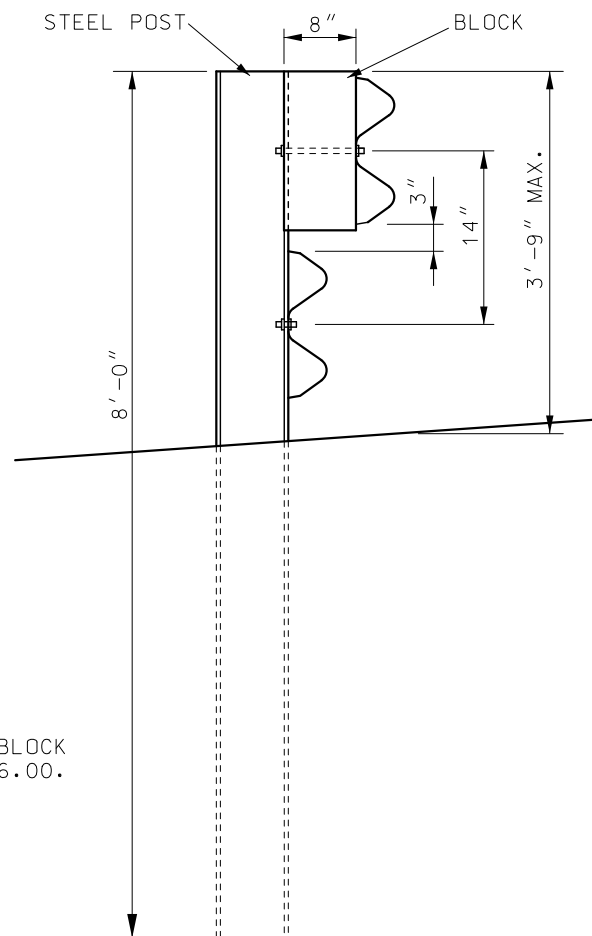
PLAN



ELEVATION OF 6' POST

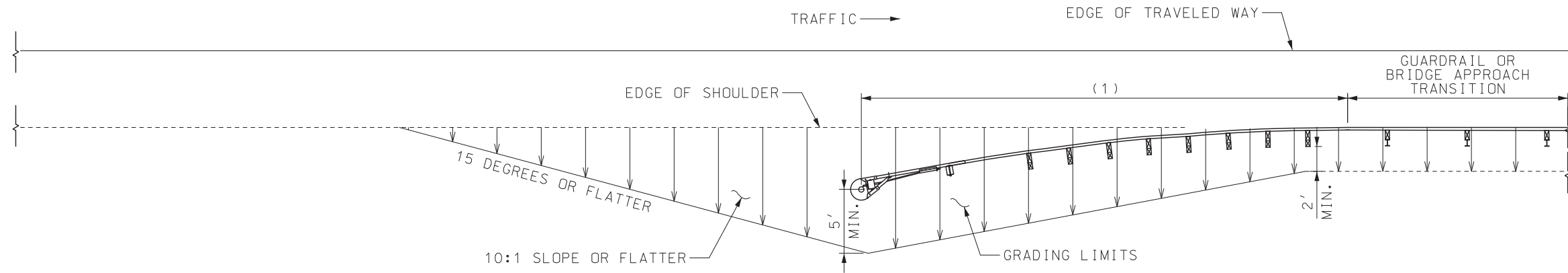
FOR ADDITIONAL POST AND BLOCK DETAILS SEE STD PLANS 606.00.

STEEL POST AND BLOCK DETAIL

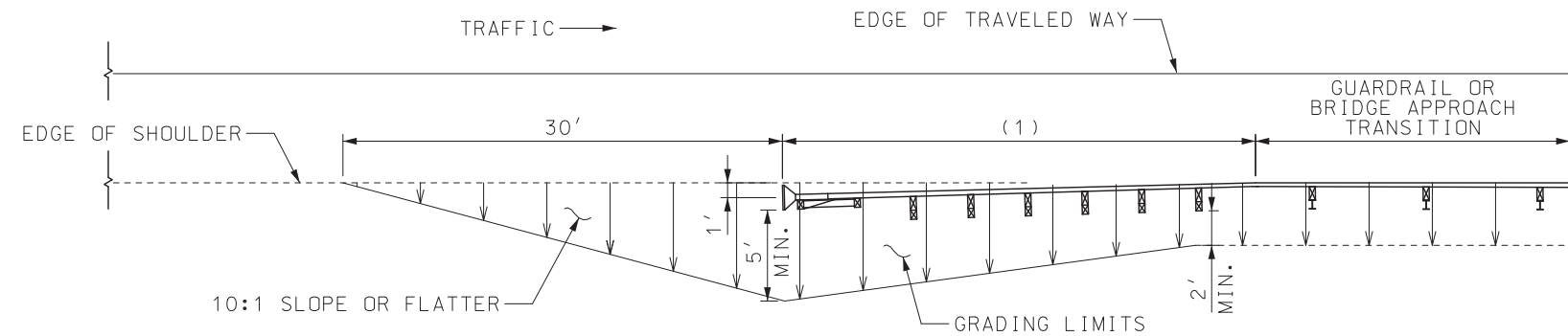


ELEVATION 8' POST

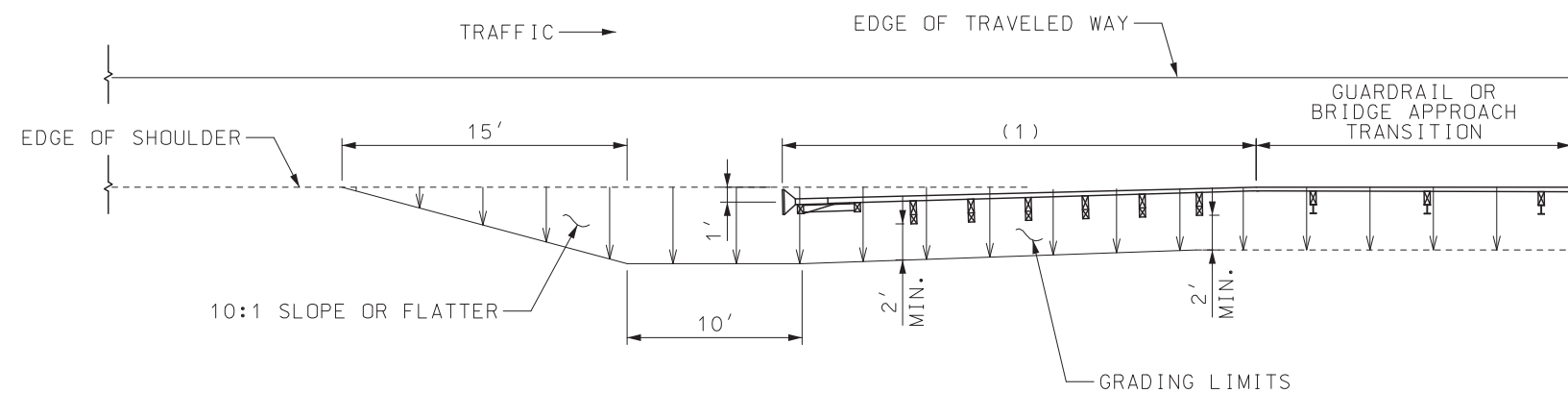
|                                                                                                                                                                                                                                  |                                                                 |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                 |         |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>GUARDRAIL<br/>EMBEDDED TERMINAL ENDS<br/>GENERAL DETAILS</b> |         |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 04/01/2021<br>DATE PREPARED: 1/27/2021          | 606.30L |



GRADING LIMITS FOR FLARED CRASHWORTHY END TERMINALS



STANDARD GRADING LIMITS FOR CRASHWORTHY END TERMINALS



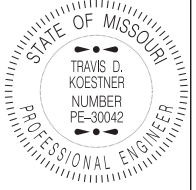
ALTERNATE GRADING LIMITS FOR CRASHWORTHY END TERMINALS

GENERAL NOTES:

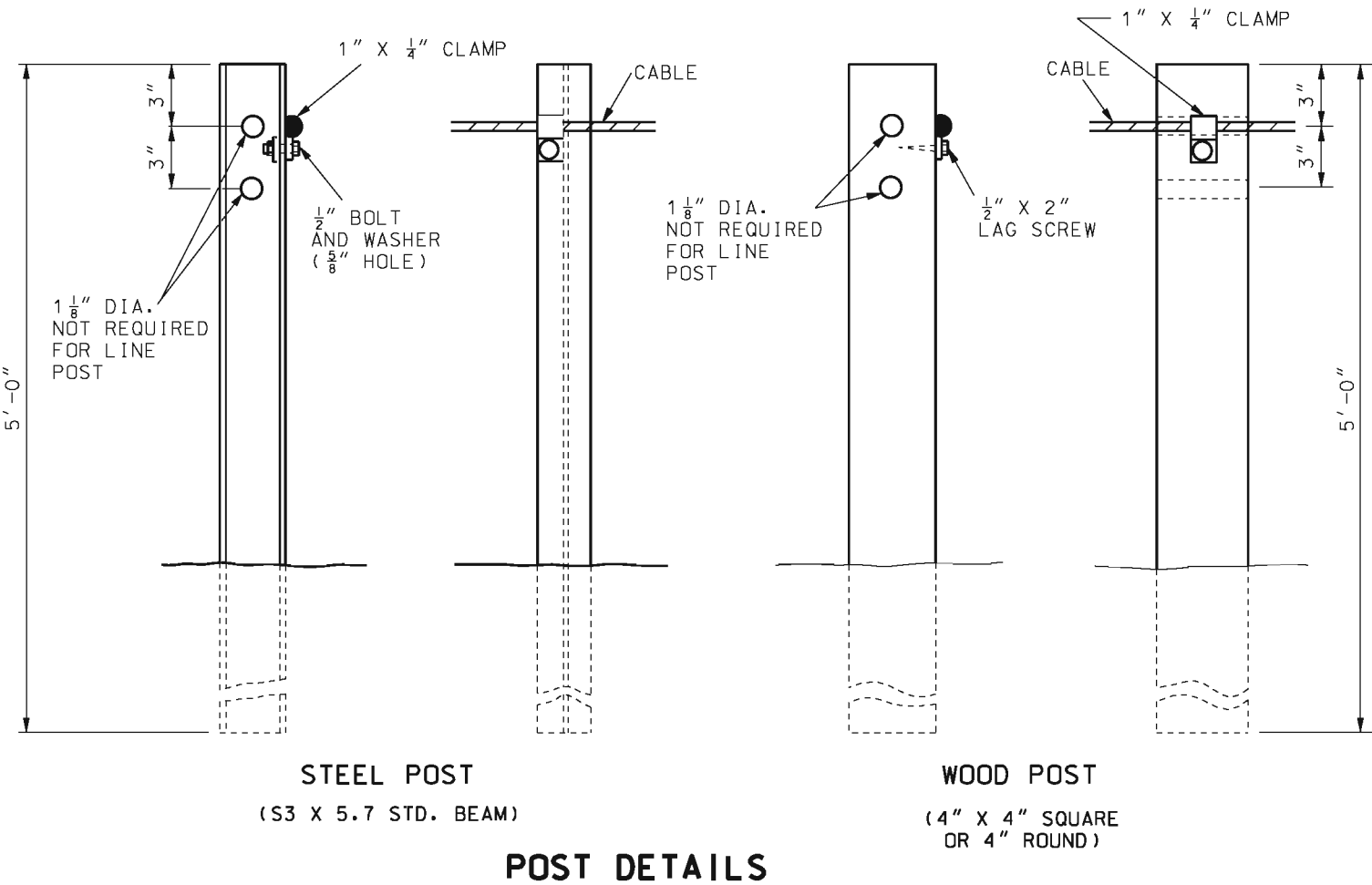
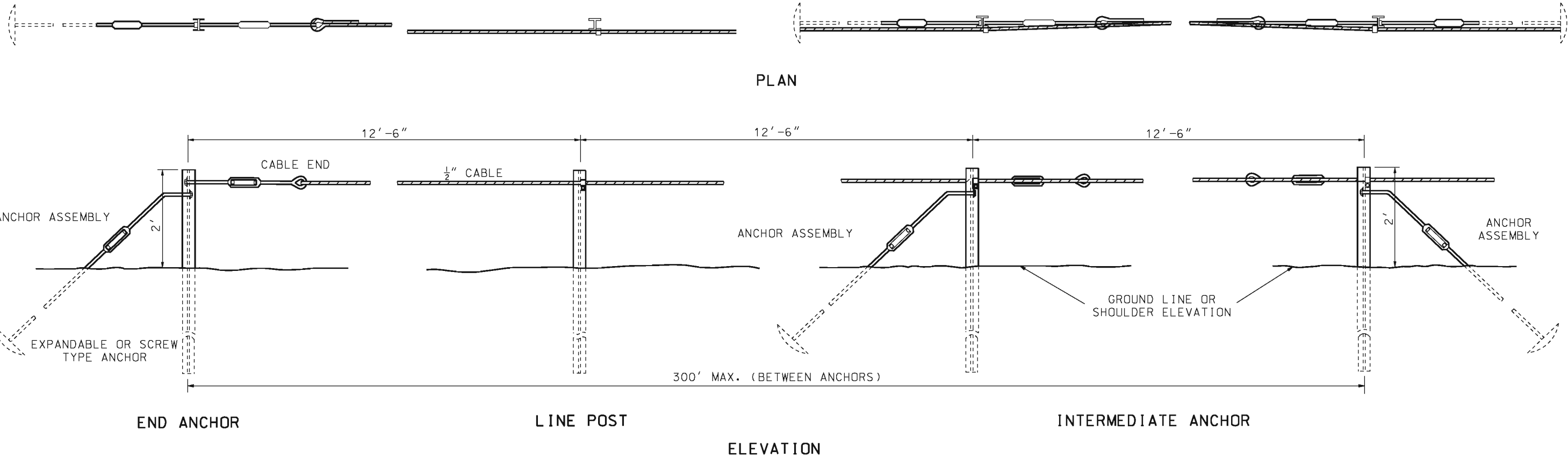
STANDARD GRADING LIMITS SHALL BE USED WHEN CONSTRUCTING A NEW ROADBED. ALTERNATE GRADING LIMITS ARE ALLOWABLE ON EXISTING ROADBEDS EXCEPT WHEN STANDARD GRADING IS INDICATED ON THE PLANS.

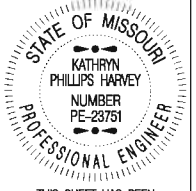
THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH APPROVED SHOP DRAWINGS OF THE APPROVED CRASHWORTHY END TERMINAL.

END ANCHORS SHALL BE INSTALLED ON ENDS OF GUARDRAIL RUNS WHERE CRASHWORTHY END TERMINALS ARE NOT REQUIRED.

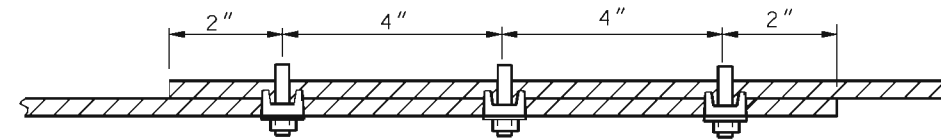
|                                                                                                                                                                                                                                                                 |                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                   |                                                                       |
|  <p>STATE OF MISSOURI<br/>TRAVIS D. KOESTNER<br/>NUMBER PE-30042<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p><b>CRASHWORTHY END TERMINALS<br/>TYPE A<br/>GRADING LIMITS</b></p> |
| <p>DATE EFFECTIVE: 10/01/2019<br/>DATE PREPARED: 7/18/2019</p>                                                                                                                                                                                                  | <p>606.31B</p>                                                        |
| <p>SHEET NO.<br/>1 OF 1</p>                                                                                                                                                                                                                                     |                                                                       |

(1) APPROVED CRASHWORTHY END TERMINAL



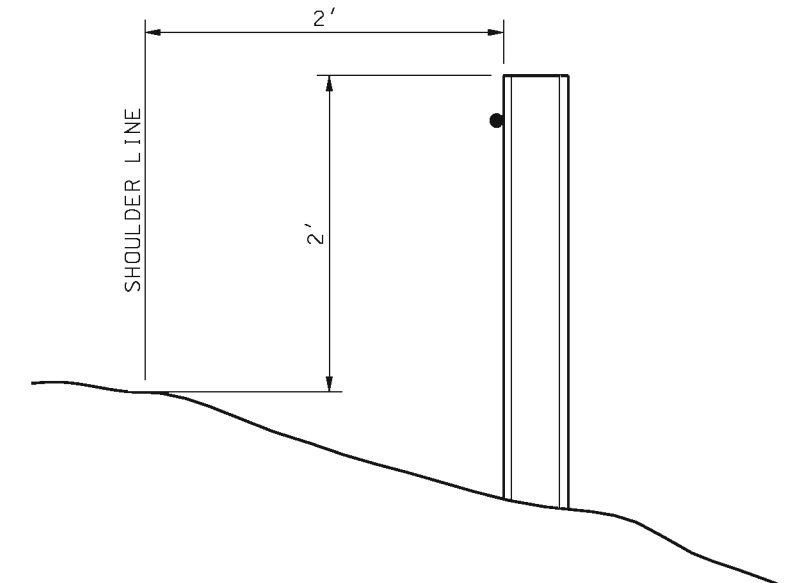
|                                                                                                                                                                                                                                  |                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                          |
|                                                                                                                                             | <b>ONE-STRAND ACCESS RESTRAINT CABLE</b> |
| DATE EFFECTIVE: 07/01/2004<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <b>606.40D</b><br>SHEET NO. 1 OF 2       |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

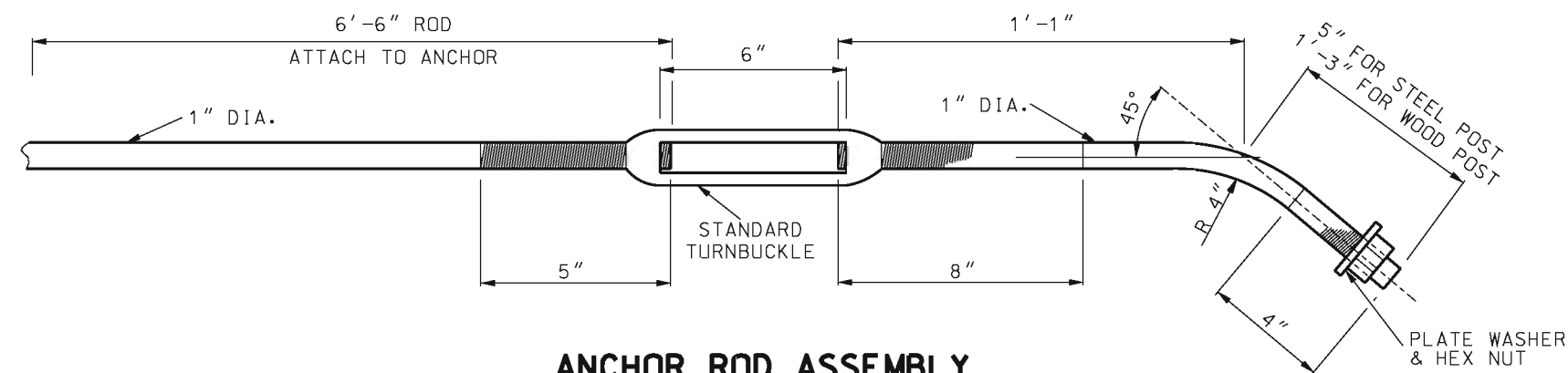


ACCESS-RESTRAINT CABLE GREATER THAN 300 FEET IN LENGTH REQUIRES AN INTER-MEDIATE ANCHOR AS SHOWN.

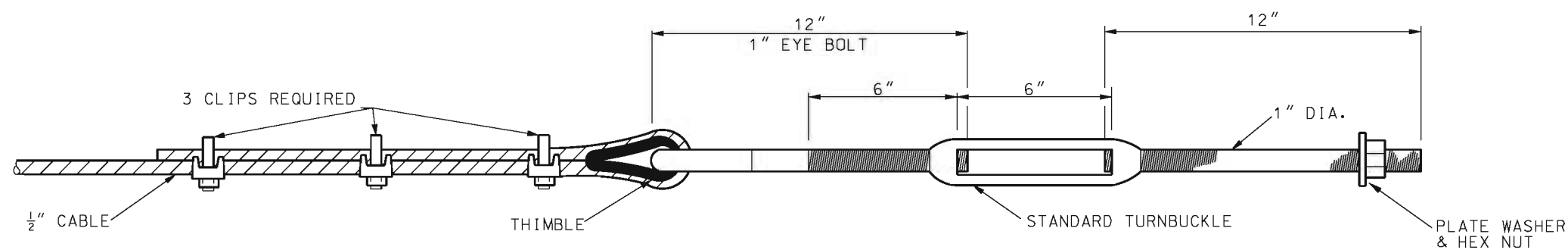
### SPLICE DETAIL



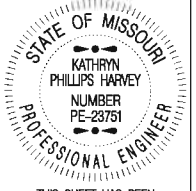
### TYPICAL LOCATION SHOULDER INSTALLATION



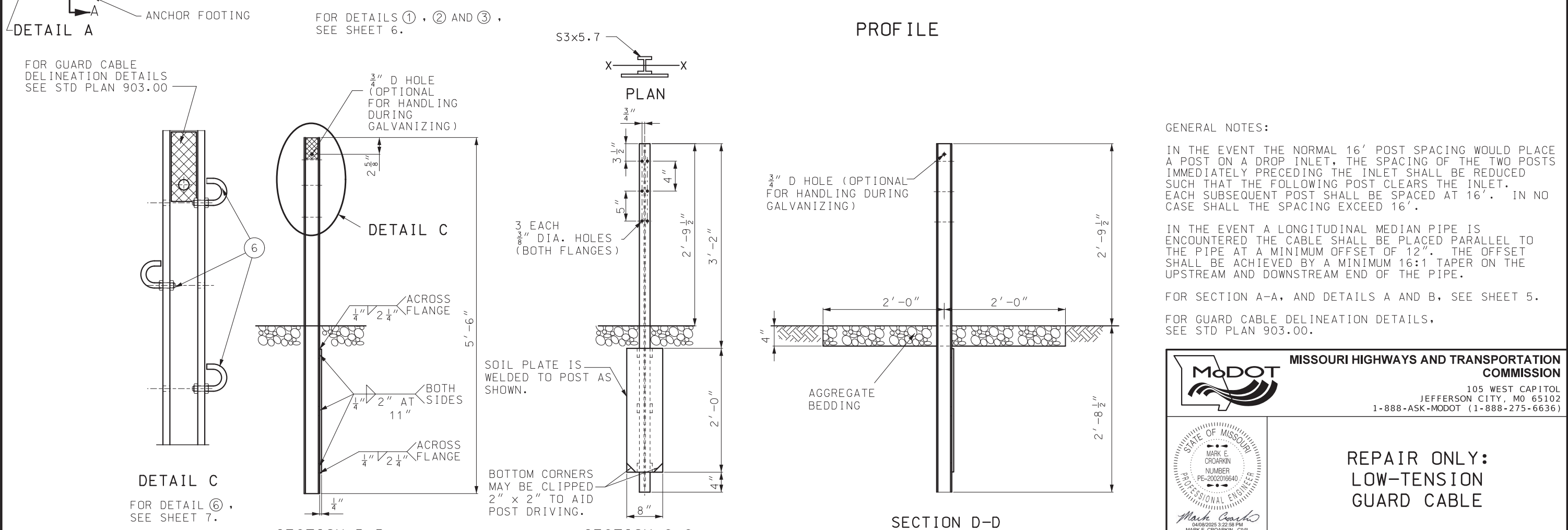
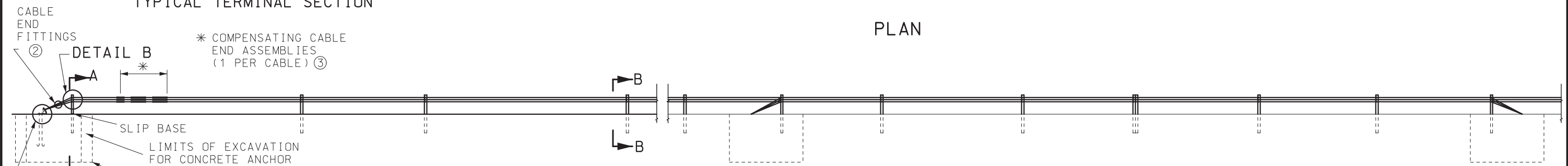
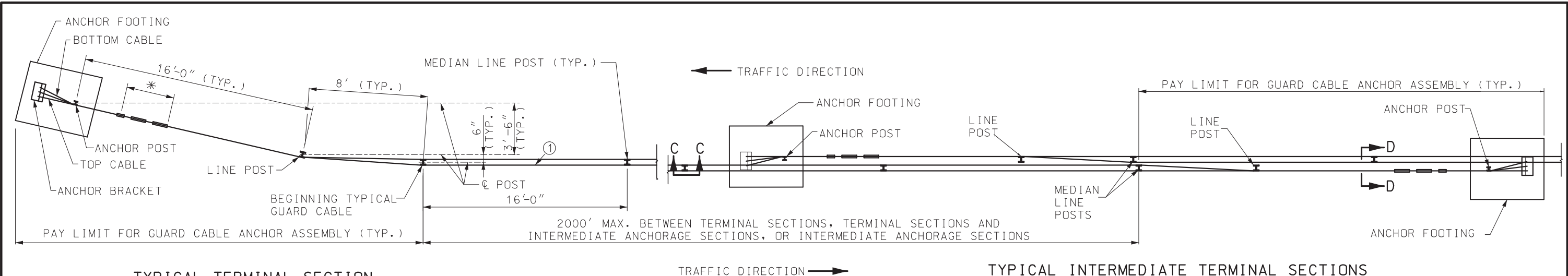
### ANCHOR ROD ASSEMBLY



### CABLE END

|                                                                                                                                                                                                                                  |                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                          |
|                                                                                                                                             | <b>ONE-STRAND ACCESS RESTRAINT CABLE</b> |
| DATE EFFECTIVE: 07/01/2004<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <b>606.40D</b>                           |
| SHEET NO.<br>2 OF 2                                                                                                                                                                                                              |                                          |





**GENERAL NOTES:**

IN THE EVENT THE NORMAL 16' POST SPACING WOULD PLACE A POST ON A DROP INLET, THE SPACING OF THE TWO POSTS IMMEDIATELY PRECEDING THE INLET SHALL BE REDUCED SUCH THAT THE FOLLOWING POST CLEARS THE INLET. EACH SUBSEQUENT POST SHALL BE SPACED AT 16'. IN NO CASE SHALL THE SPACING EXCEED 16'.

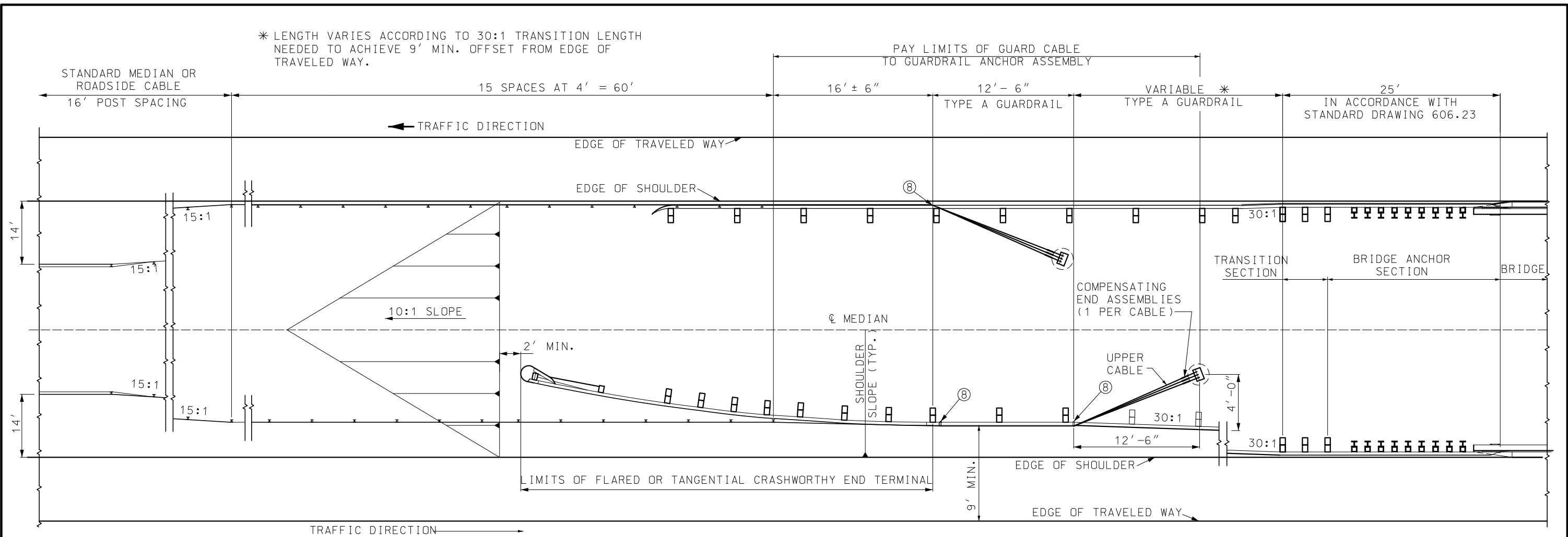
IN THE EVENT A LONGITUDINAL MEDIAN PIPE IS ENCOUNTERED THE CABLE SHALL BE PLACED PARALLEL TO THE PIPE AT A MINIMUM OFFSET OF 12". THE OFFSET SHALL BE ACHIEVED BY A MINIMUM 16:1 TAPER ON THE UPSTREAM AND DOWNSTREAM END OF THE PIPE.

FOR SECTION A-A, AND DETAILS A AND B, SEE SHEET 5.

FOR GUARD CABLE DELINEATION DETAILS, SEE STD PLAN 903.00.

|                                                                                                                                                         |                                                            |                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                            |                             |
|                                                                                                                                                         | <p><b>REPAIR ONLY:<br/>LOW-TENSION<br/>GUARD CABLE</b></p> |                             |
| <p>DATE EFFECTIVE: 7/1/2025<br/>DATE PREPARED: 3/26/2025</p>                                                                                            | <p>606.41N</p>                                             | <p>SHEET NO.<br/>1 OF 7</p> |





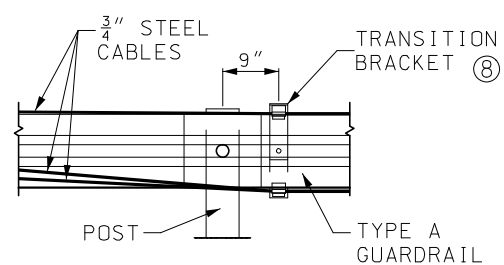
## GUARD CABLE TO GUARDRAIL TRANSITION AT MEDIAN BRIDGE END

### GENERAL NOTES:

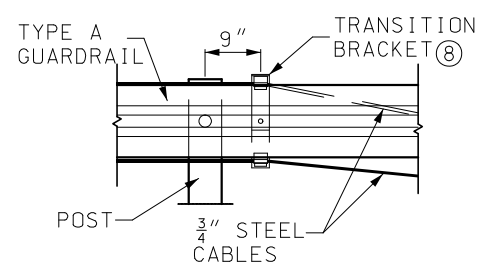
WHEN GUARD CABLE IS LOCATED ALONG THE MEDIAN CENTERLINE NEAR A BRIDGE END OR CONCRETE BARRIER, IT SHALL BE ANCHORED BEHIND THE GUARDRAIL ASSEMBLY WITH THE GUARD CABLE ANCHOR ASSEMBLY. THE GUARD CABLE ANCHOR SHALL BE PROTECTED BY THE GUARDRAIL.

THIS DRAWING DEPICTS THE ATTACHMENT OF GUARD CABLE TO GUARDRAIL. IT DOES NOT INDICATE THAT TWO RUNS OF CABLE ARE REQUIRED.

SUITABLE DRAINAGE MUST BE PROVIDED WHEN MEDIAN GRADING IMPEDES NORMAL FLOW.

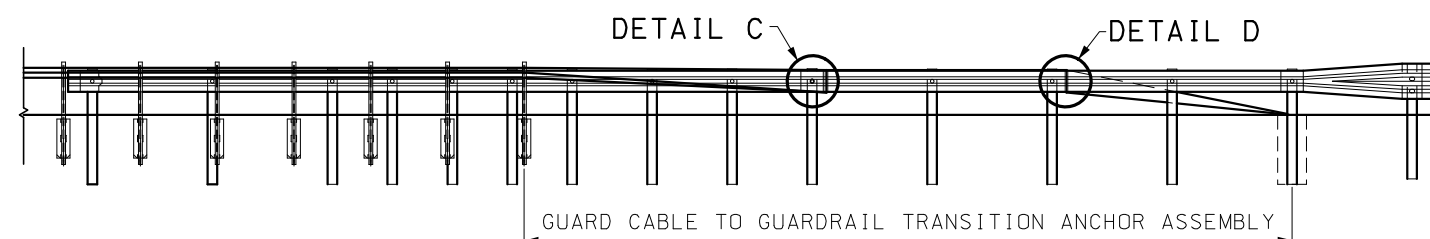


DETAIL C

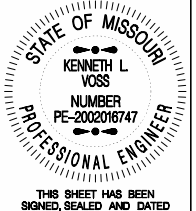


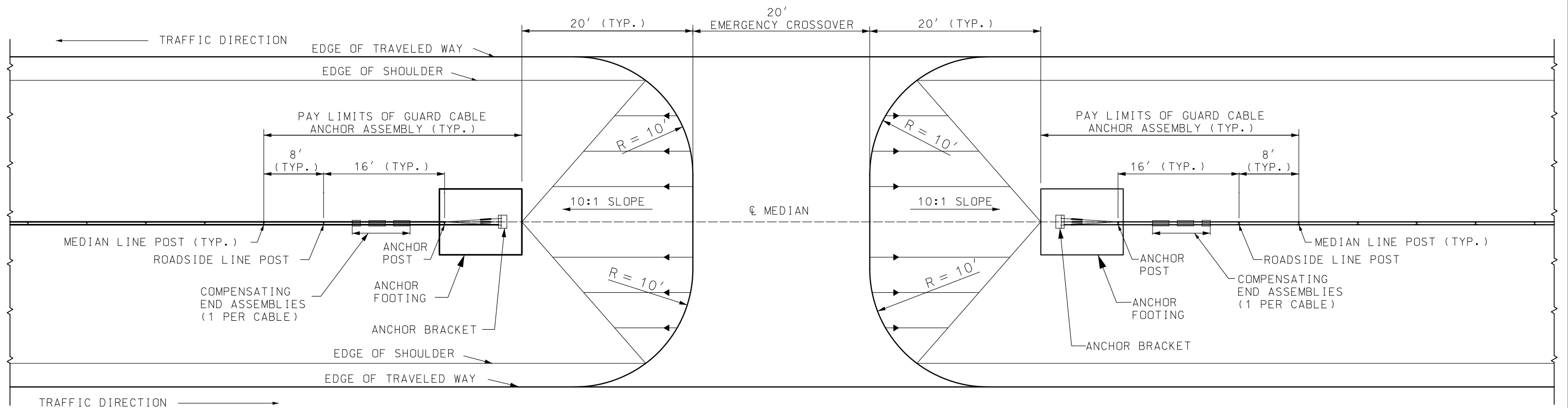
DETAIL D

FOR DETAIL (8)  
SEE SHEET 7.

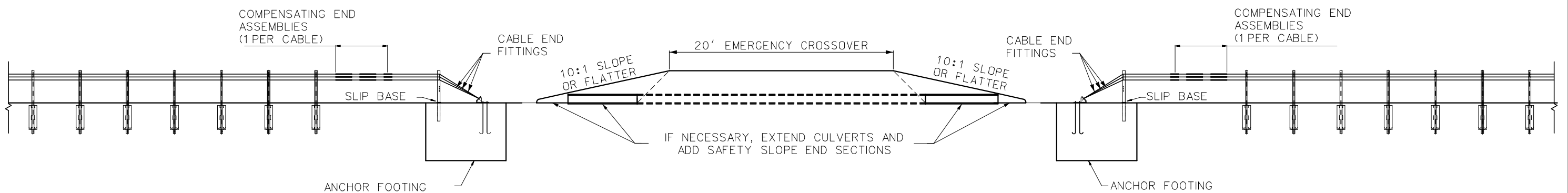


TYPICAL GUARD CABLE TO GUARDRAIL TRANSITION ELEVATION

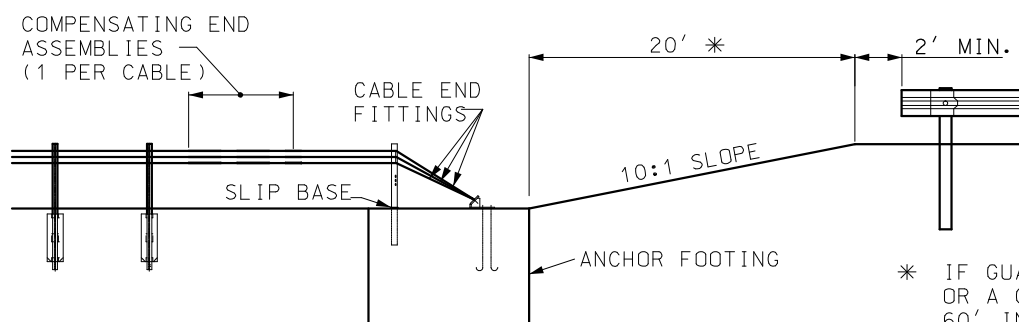
|                                                                                                                                                                                                                                  |                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                     |
|                                                                                                                                             | <b>REPAIR ONLY:<br/>LOW-TENSION<br/>GUARD CABLE</b> |
| DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                                                                                                                                                                             | <b>606.41N</b>                                      |
| SHEET NO.<br><b>3 OF 7</b>                                                                                                                                                                                                       |                                                     |



PLAN



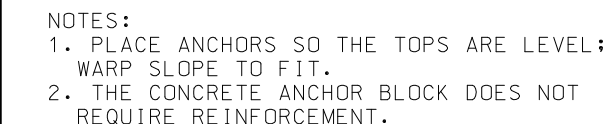
ELEVATION



PROFILE AT MEDIAN OBSTACLE WITH BULLNOSE OR IN A MEDIAN LESS THAN 60'

\* IF GUARD CABLE IS USED WITH BULLNOSE GUARDRAIL SYSTEM, OR A CRASHWORTHY END TERMINAL ON A MEDIAN LESS THAN 60' IN WIDTH, THE CABLE ANCHORAGE SHALL BE PLACED ON THE MEDIAN CENTERLINE 20' FROM THE NOSE OF THE CRASHWORTHY END TERMINAL OR BULLNOSE GUARDRAIL SYSTEM.

|                                                                                                                                                                                                                                  |                                                                                      |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                      |                |
| <br><small>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</small>                                                             | <b>REPAIR ONLY:<br/>LOW-TENSION<br/>GUARD CABLE<br/>TRANSITION AT MEDIAN OPENING</b> |                |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                                 | <b>606.41N</b> |



| STANDARDIZED HARDWARE |                                 |
|-----------------------|---------------------------------|
| ①                     | WIRE ROPE                       |
| ②                     | CABLE END FITTING               |
| ③                     | COMPENSATING CABLE END ASSEMBLY |
| ④                     | ANCHOR BRACKET                  |
| ⑤                     | U-BOLT CABLE CLIPS              |
| ⑥                     | CABLE HOOK BOLT AND NUT         |
| ⑦                     | HOOKEED ANCHOR BOLT AND NUTS    |
| ⑧                     | CABLE TRANSITION BRACKET        |

GENERAL NOTES:

FOR ARRANGEMENT OF SPRING AND COMPENSATING CABLE END ASSEMBLIES AND TURNBUCKLE CABLE END ASSEMBLIES, THE FOLLOWING CRITERIA SHALL APPLY: LENGTH OF CABLE RUNS TO 1000' - USE COMPENSATING CABLE END ASSEMBLY ON ONE END AND THE TURNBUCKLE CABLE END ASSEMBLY ON THE OTHER END OF EACH INDIVIDUAL CABLE. FOR LENGTHS LONGER THAN 1000' AND UP TO AND INCLUDING 2000' - USE COMPENSATING CABLE END ASSEMBLY ON EACH END OF THE INDIVIDUAL CABLE.

PRIOR TO FINAL ACCEPTANCE BY THE ENGINEER, THE FOLLOWING PROCEDURES SHALL BE USED TO TIGHTEN THE TURNBUCKLES. DEPENDING ON THE TEMPERATURE AT THE TIME OF THE ADJUSTMENT IN ACCORDANCE WITH THE FOLLOWING TABLE:

## TERMINAL ANCHOR ASSEMBLY



NOTES:

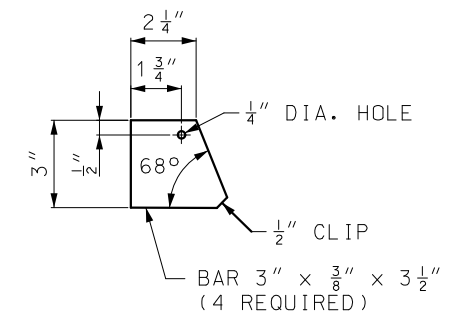
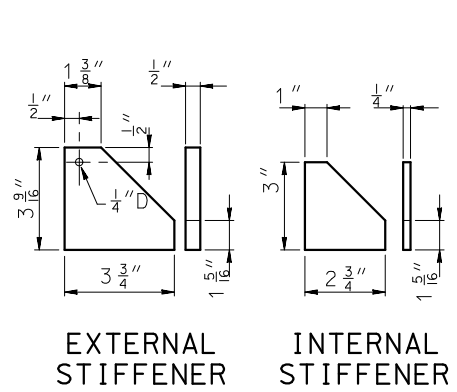
1. LINE POST CABLE SPACING SHALL BE TRANSITIONED TO 3" BETWEEN THE TWO LINE POSTS IMMEDIATELY PRECEDING THE ANCHOR POST.
2. CABLES PLACED ON BOTH POST FACES SHALL BE TRANSITIONED TO THE FRONT FACE BETWEEN THE TWO LINE POSTS IMMEDIATELY PRECEDING THE ANCHOR POST.



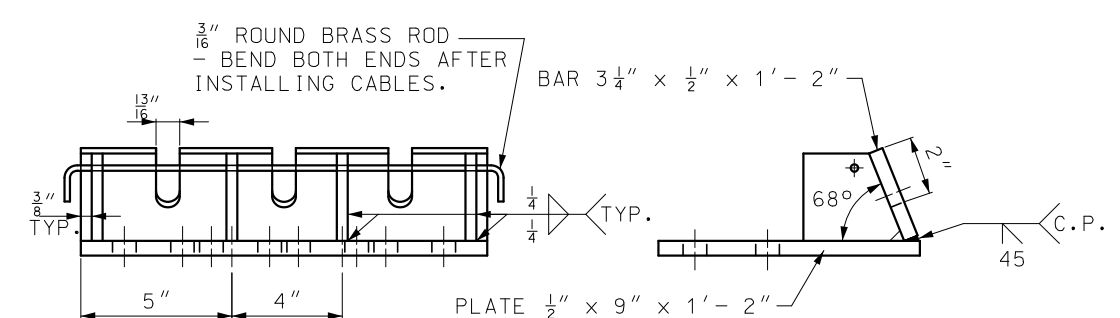
| TEMPERATURE ( °F ) | SPRING COMPRESSION<br>FROM UNLOADED<br>POSITION IN<br>EACH SPRING |
|--------------------|-------------------------------------------------------------------|
| 120 TO 100         | 1 "                                                               |
| 99 TO 80           | 1 ½ "                                                             |
| 79 TO 60           | 2 "                                                               |
| 59 TO 40           | 2 ½ "                                                             |
| 39 TO 20           | 3 "                                                               |
| 19 TO 0            | 3 ½ "                                                             |
| -1 TO -20          | 4 "                                                               |

THE SPECIFICATIONS AND DIMENSIONS OF ALL HARDWARE AND FITTINGS SHALL COMPLY WITH AASHTO-AGC-ARTBA JOINT TASK FORCE 13 REPORT, A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE.

|                                                                                                                                                                                  |                                                                                                                                                                                          |  |                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------|
|                                                                                             | <p align="center"><b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b></p> <p align="right">105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |  |                                                   |
|  <p align="center">THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p align="center"><b>REPAIR ONLY:<br/>LOW-TENSION<br/>GUARD CABLE</b></p>                                                                                                                |  |                                                   |
| <p>DATE EFFECTIVE: <u>7/1/2024</u></p> <p>DATE PREPARED: <u>4/10/2024</u></p>                                                                                                    | <p align="center"><b>606.41N</b></p>                                                                                                                                                     |  | <p align="center">SHEET NO.<br/><b>5 OF 7</b></p> |



STIFFENER



## GUARD CABLE TO GUARDRAIL TRANSITION



## ② CABLE END FITTINGS



GENERAL NOTES:

THE SPECIFICATIONS AND DIMENSIONS OF ALL HARDWARE AND FITTINGS SHALL COMPLY WITH AASHTO-AGC-ARTBA JOINT TASK FORCE 13 REPORT, A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE.



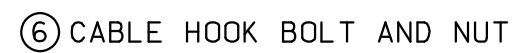
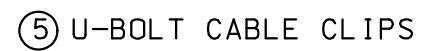
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



DATE EFFECTIVE: 7/1/2024  
DATE PREPARED: 4/10/2024

606.41 N

SHEET NO.  
6 OF 7



CABLE SPLICE

GENERAL NOTES:

REPAIR SPLICES FOR LOW-TENSION SYSTEMS SHALL BE NO CLOSER THAN 400' AND NO MORE THAN FOUR SPLICES PER CABLE WITHIN A 2,000' RUN. WHEN REPAIR TO A LOW-TENSION CABLE REQUIRES SPLICES CLOSER THAN 400' OR MORE THAN FOUR SPLICES PER CABLE WITHIN A 2,000' RUN, THE FULL 2,000' CABLE LENGTH MAY BE REPLACED WITH THE ENGINEER'S APPROVAL.



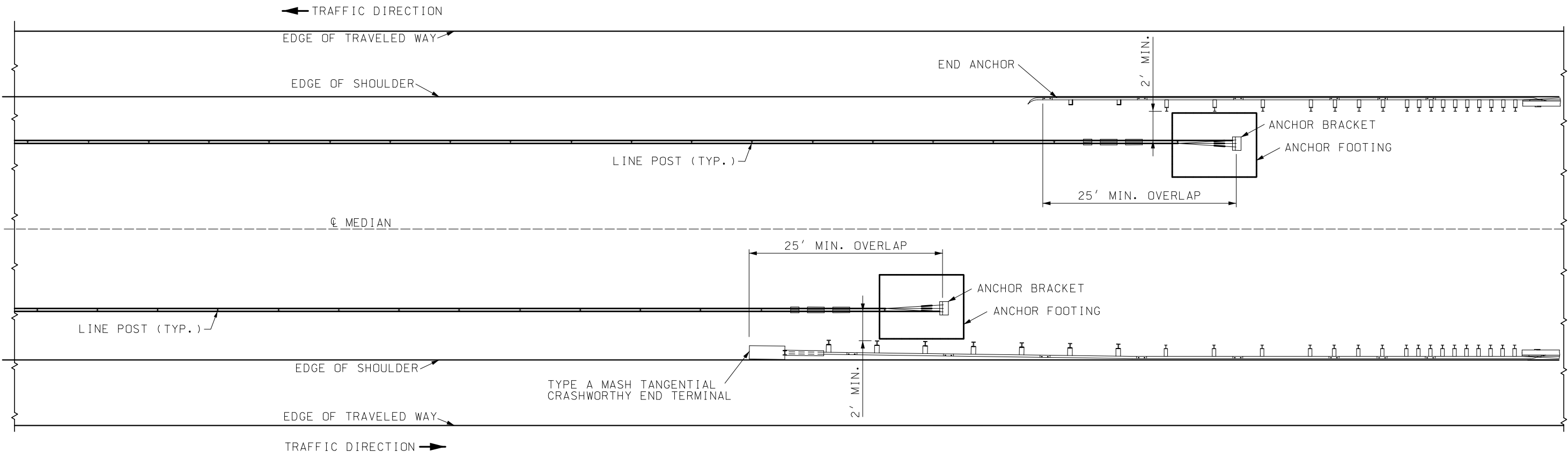
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



DATE EFFECTIVE: 7/1/2024  
DATE PREPARED: 4/10/2024

606.41 N

SHEET NO.  
7 OF 7



GENERAL NOTES:

LINE POST SPACING SHOULD NOT EXCEED 20' OR THE MANUFACTURER'S RECOMMENDATION.

THIS DRAWING DEPICTS THE OVERLAP OF GUARD CABLE AND GUARDRAIL. IT DOES NOT INDICATE THAT TWO RUNS OF CABLE ARE REQUIRED.

REPAIR SPLICES FOR HIGH-TENSION SYSTEMS SHALL BE NO CLOSER THAN 200' PER CABLE WITHIN A 1,000' RUN. WHEN A REPAIR TO A HIGH-TENSION CABLE REQUIRES SPLICES CLOSER THAN 200', A LONGER SECTION MAY BE REPLACED TO REDUCE THE NUMBER OF SPLICES FROM TURNBUCKLE TO TURNBUCKLE WITH THE ENGINEER'S APPROVAL.



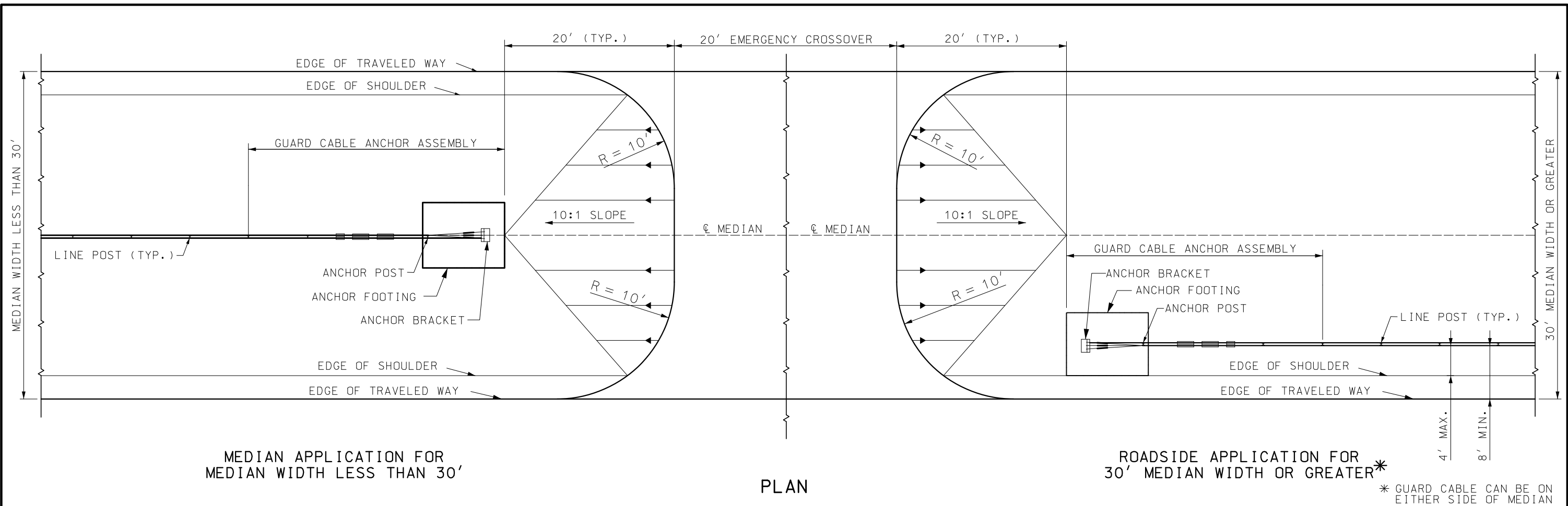
**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



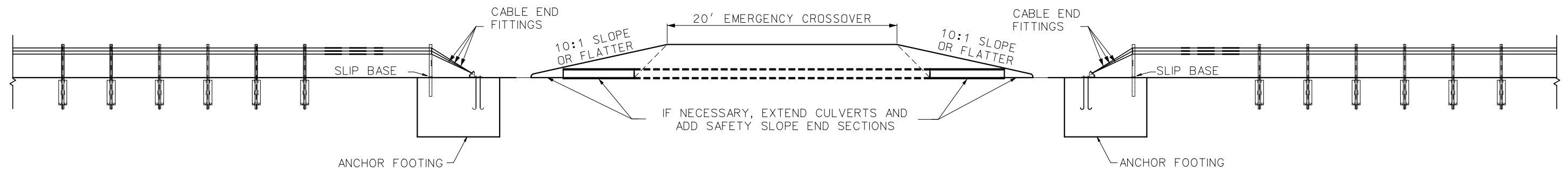
**HIGH-TENSION GUARD CABLE**  
**TANGENTIAL GUARDRAIL OVERLAP**

|                 |           |        |                     |
|-----------------|-----------|--------|---------------------|
| DATE EFFECTIVE: | 7/1/2024  | 606.42 | SHEET NO.<br>1 OF 2 |
| DATE PREPARED:  | 4/10/2024 |        |                     |



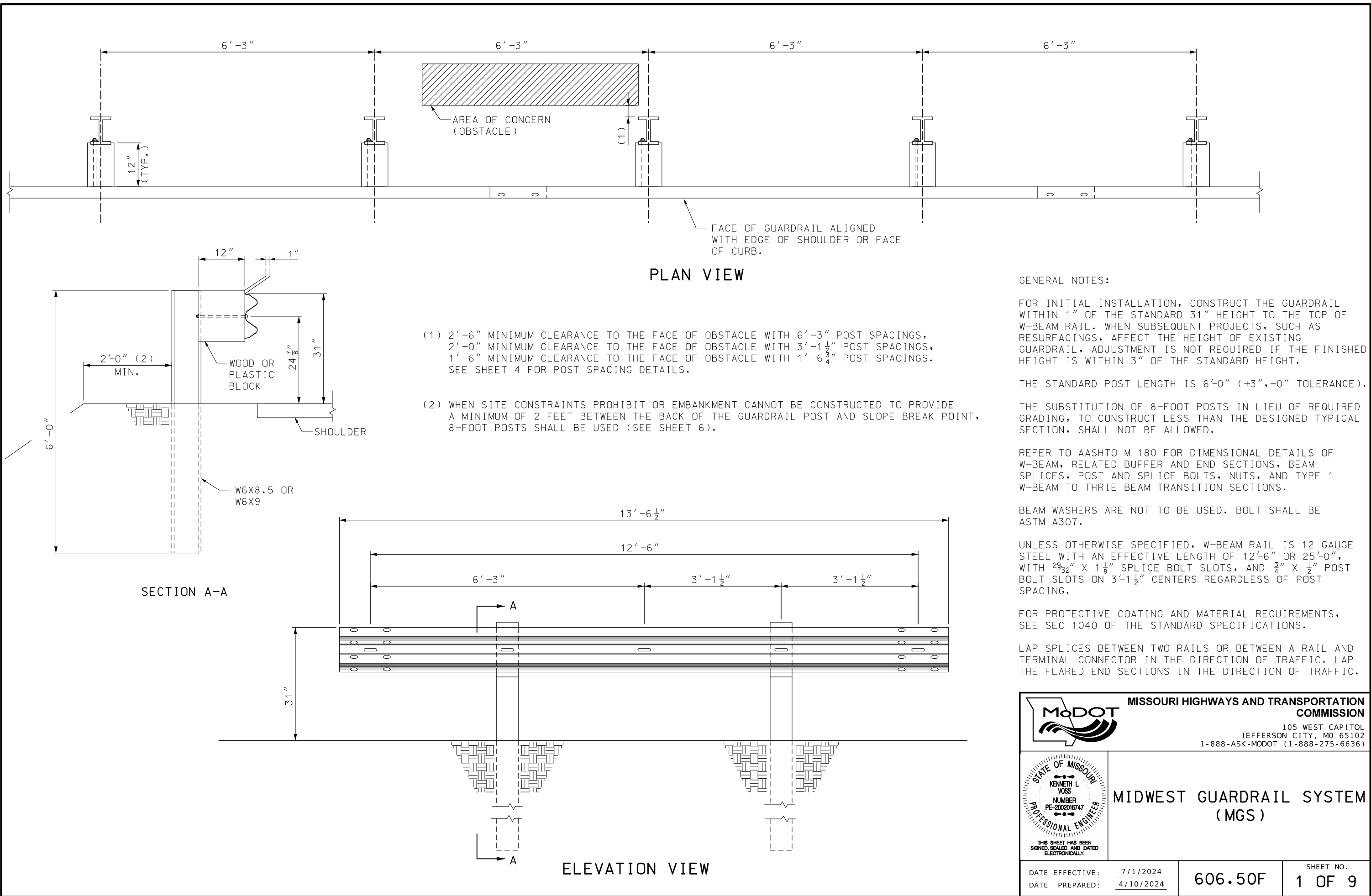


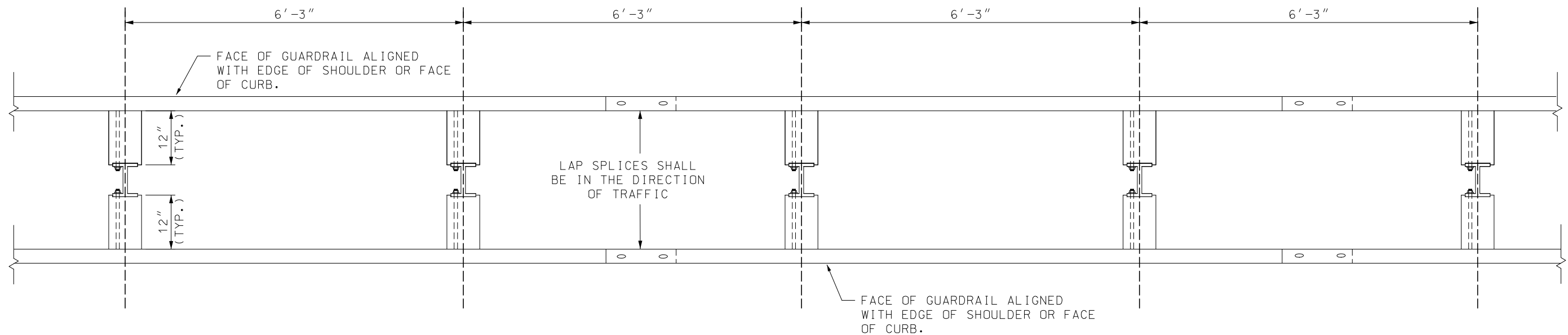
PLAN



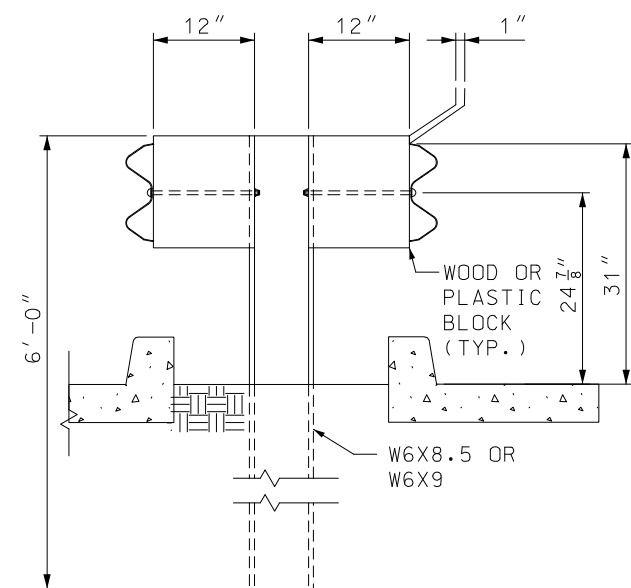
PROF ILE

|                                                                                                                                                                                                                                  |                                                                      |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                      |        |
| <br>THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY.                                                                      | <b>HIGH-TENSION<br/>GUARD CABLE<br/>TRANSITION AT MEDIAN OPENING</b> |        |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                 | 606.42 |

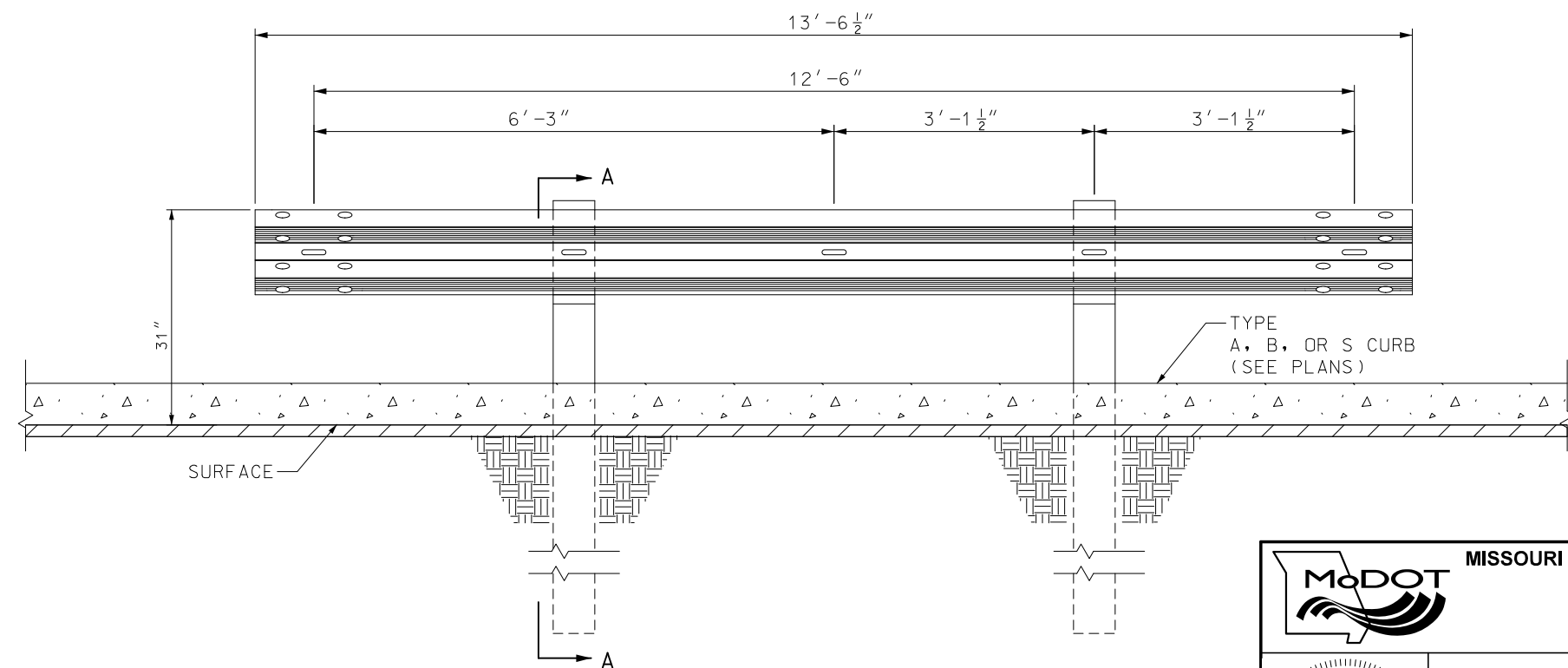




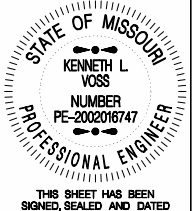
PLAN VIEW

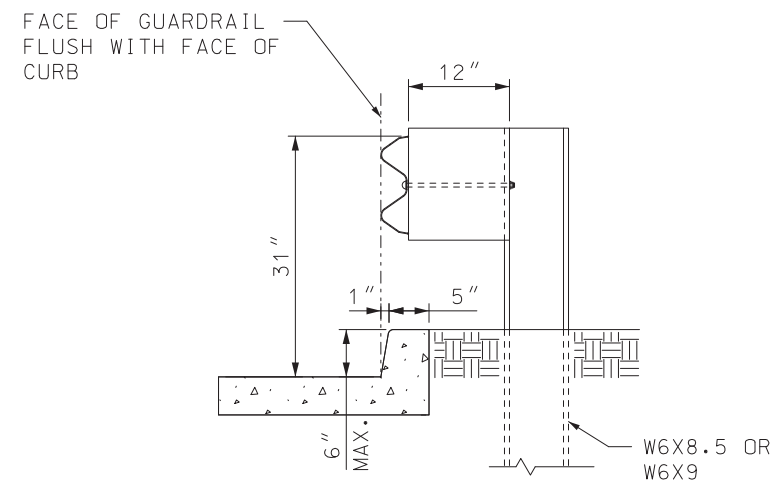


SECTION A-A

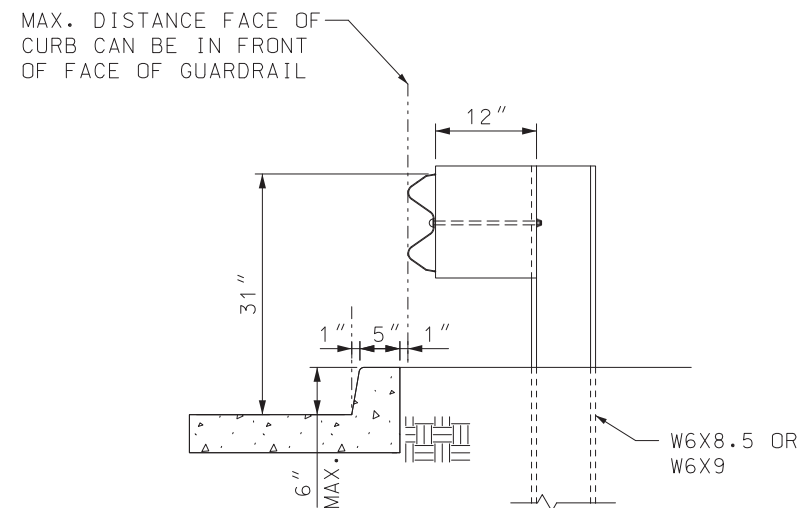


ELEVATION VIEW

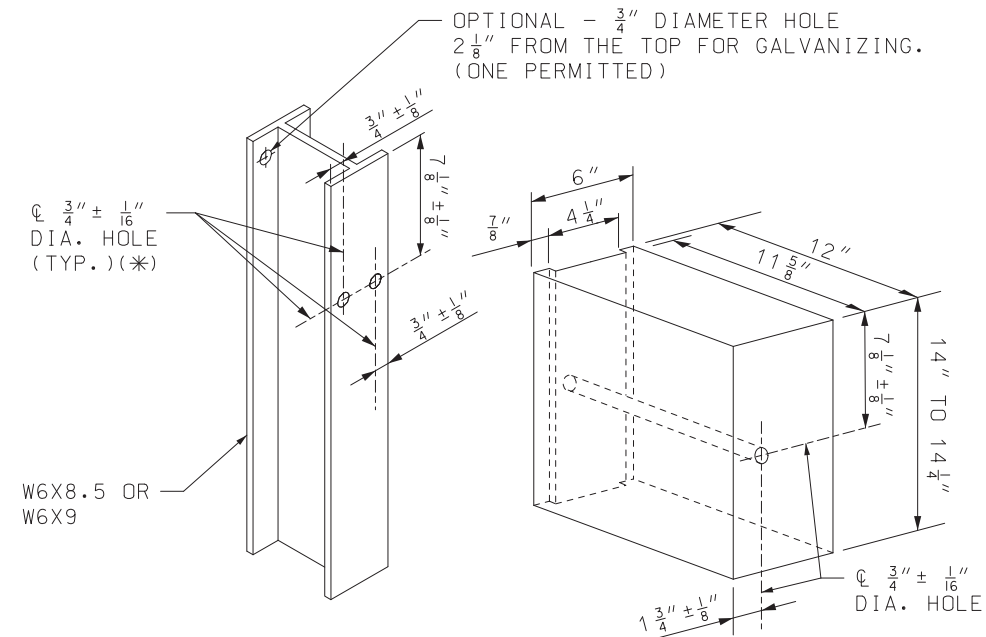
|                                                                                                                                                                                                                                  |                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                        |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>DOUBLE FACED GUARDRAIL</b> |
| DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                                                                                                                                                                             | 606.50F                                                                |
| SHEET NO. 2 OF 9                                                                                                                                                                                                                 |                                                                        |



MGS GUARDRAIL AT CURB



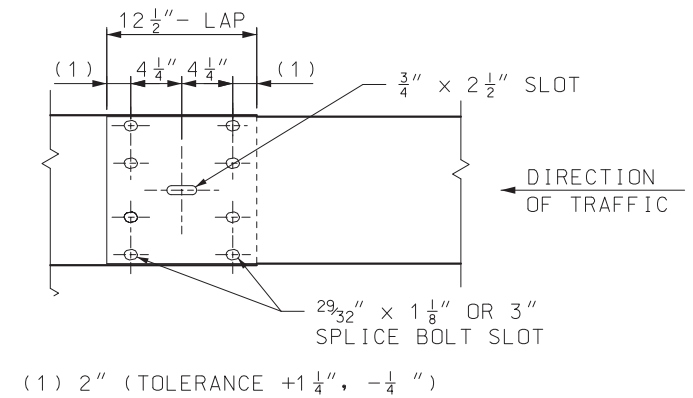
ALTERNATE MGS  
AT CURB



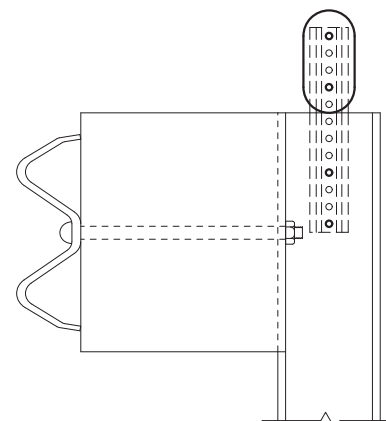
FOR STEEL POST AND NOTCHED WOOD OR PLASTIC BLOCK

### HOLE PUNCHING DETAIL

(\*) TWO HOLES CAN BE PROVIDED ON EACH FLANGE OF POST, ONLY ONE IS REQUIRED FOR FLANGE OF POST THAT HAS A BLOCK ATTACHMENT.



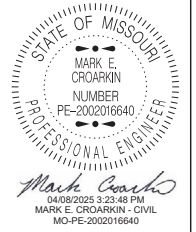
RAIL ELEMENT SPLICE  
DETAIL

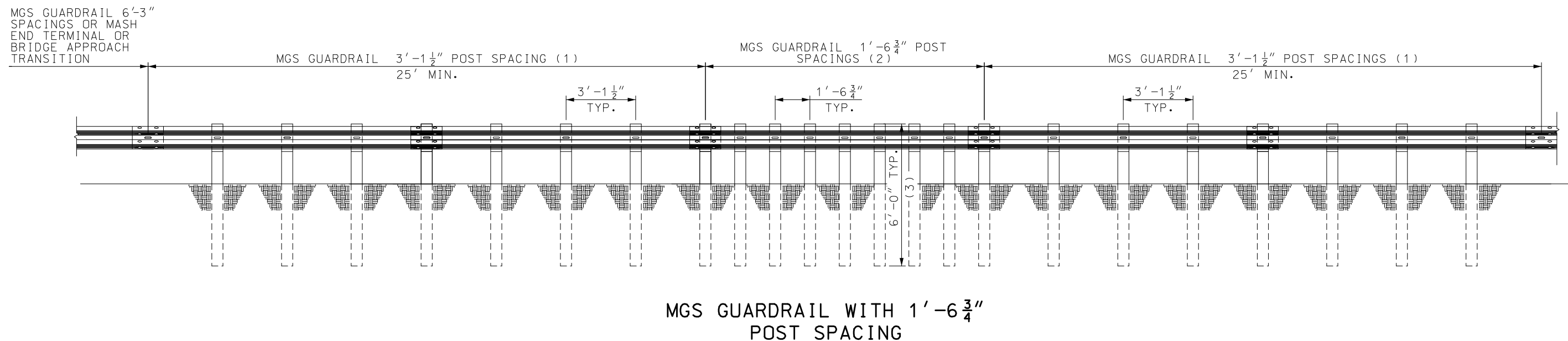
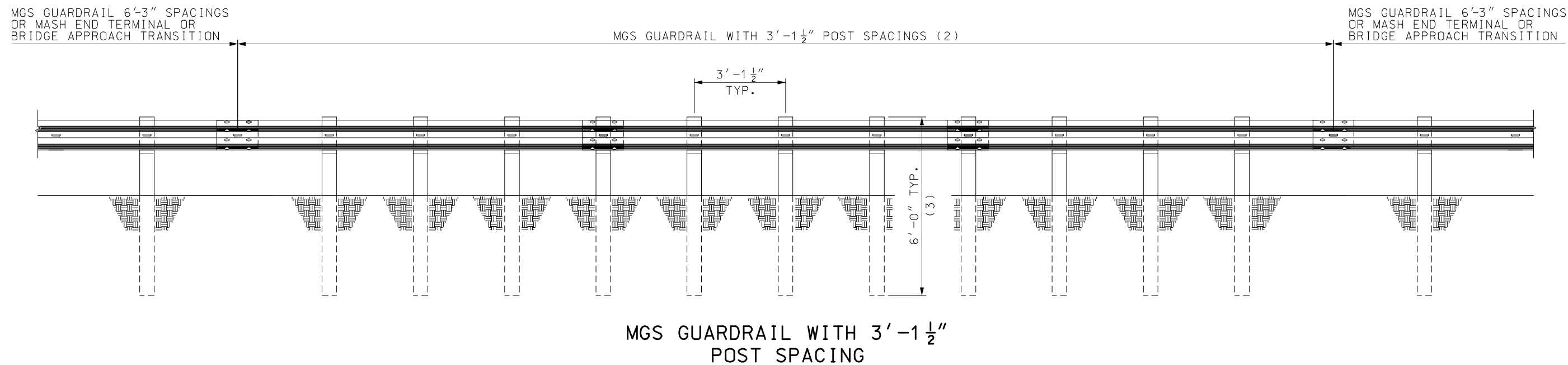


DELINEATORS ON GUARDRAIL

### GENERAL NOTES:

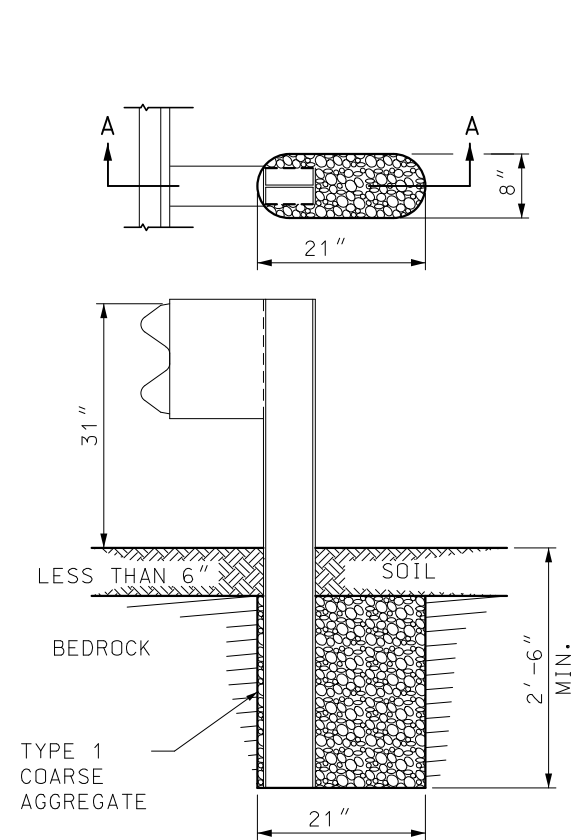
FOR GUARDRAIL DELINEATION DETAILS,  
SEE STD PLAN 903.00.

|                                                                                                                                                                                                                                  |                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>POST AND BLOCK</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/26/2025                                                                                                                                                                             | 606.50F                                                        |
| SHEET NO.<br><b>3 OF 9</b>                                                                                                                                                                                                       |                                                                |

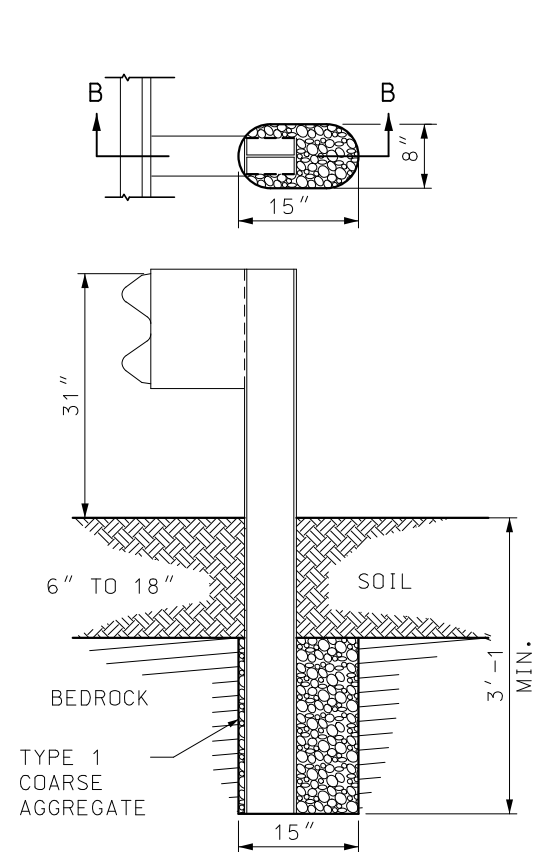


- (1) 25 FEET OF MGS 3'-1 1/2" POST SPACING GUARDRAIL IS REQUIRED ON APPROACH AND DEPARTURE ENDS OF 1'-6 3/4" POST SPACING MGS GUARDRAIL.
- (2) USE AS MANY SEGMENTS AS NECESSARY TO SHIELD THE AREA OF CONCERN.
- (3) REDUCED POST SPACING SHALL USE 6'-0" POSTS MAX. ANY DEVIATION OF 6'-0" POSTS WILL ONLY BE ALLOWED IN ACCORDANCE WITH SPECIAL INSTALLATIONS AS SHOWN ON SHEET 5.

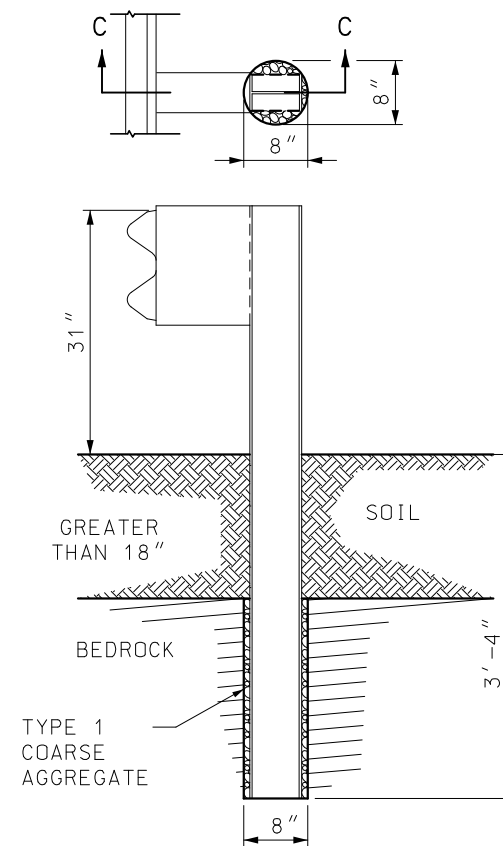
|                                                                                                                                                                                                                                  |                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                       |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>REDUCED POST SPACINGS</b> |
| DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                                                                                                                                                                             | SHEET NO.<br><b>606.50F</b><br><b>4 OF 9</b>                          |



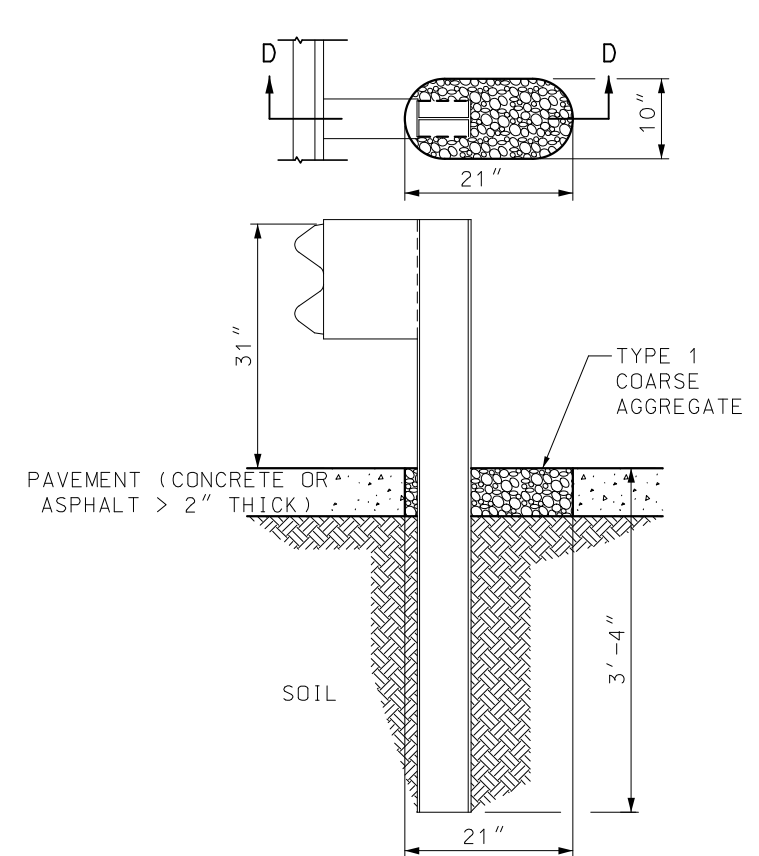
**SECTION A-A**  
ROCK ENCOUNTERED  
UP TO 6" BENEATH SURFACE



**SECTION B-B**  
ROCK ENCOUNTERED  
6" TO 18" BENEATH SURFACE

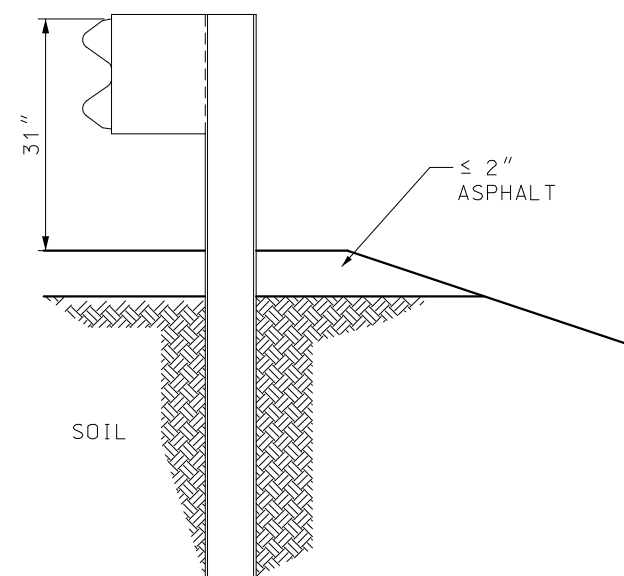


**SECTION C-C**  
ROCK ENCOUNTERED MORE  
THAN 18" BENEATH SURFACE



**SECTION D-D**  
SETTING POST THROUGH PAVEMENT  
(CONCRETE OR ASPHALT > 2" THICK)

## SETTING POST IN SOLID ROCK



**SETTING POST THROUGH ASPHALT  $\leq 2"$  THICK**

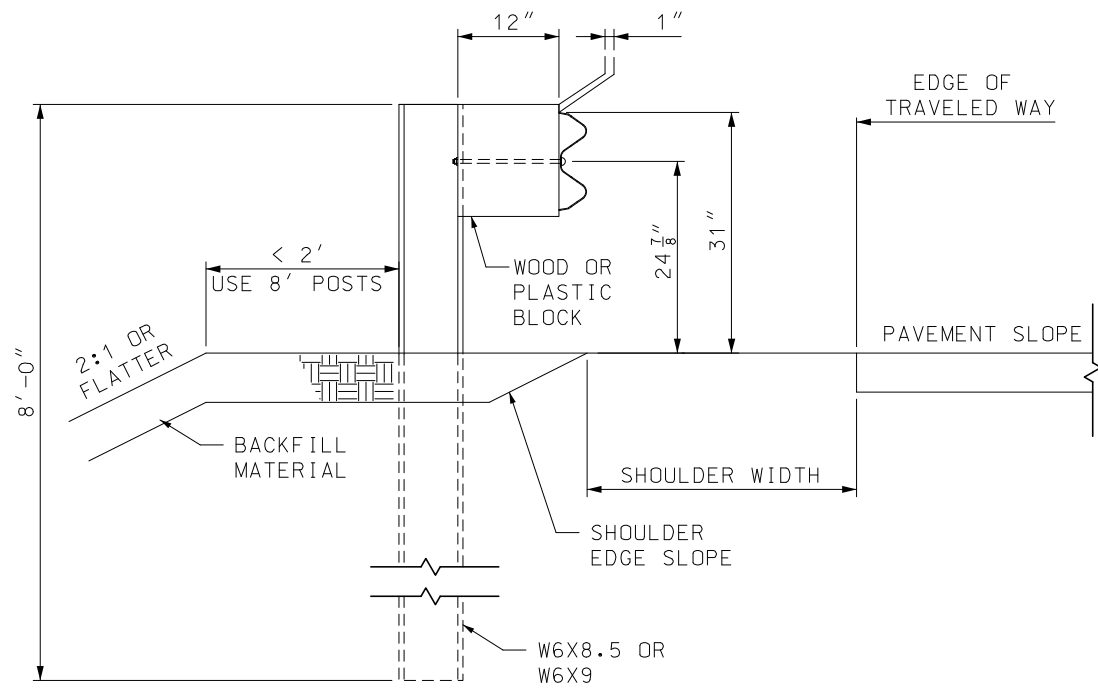
### GENERAL NOTES:

HOLES IN SOLID ROCK SHALL PROVIDE A DIAMETER OF NOT LESS THAN 4 INCHES GREATER THAN THE MAXIMUM TRANSVERSE DIMENSION OF THE POST SECTION.

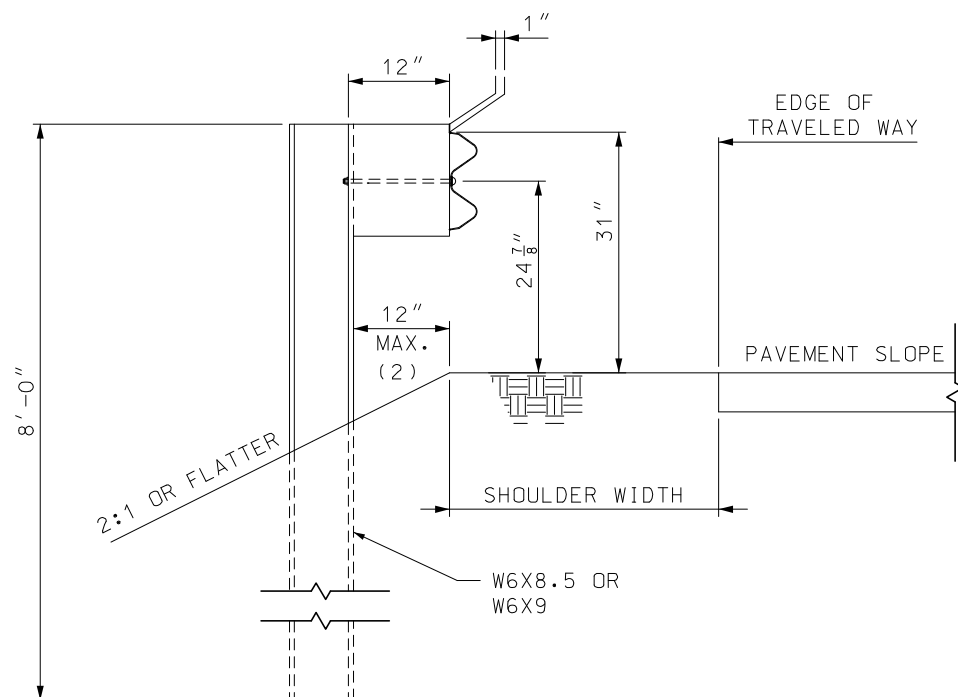
POST MAY BE SHORTER WHERE PLACED IN 2 FEET OF SOLID ROCK. STEEL POSTS MAY BE FLAME OR SAW CUT. REPAIR OF CUT SHALL BE IN ACCORDANCE WITH SEC 712 OF THE STANDARD SPECIFICATIONS.

NO ADDITIONAL PAYMENT WILL BE MADE FOR CUTTING THE OVERSIZED HOLES OR PLACING AGGREGATE IN THE HOLES, AS INDICATED IN THIS PLAN.

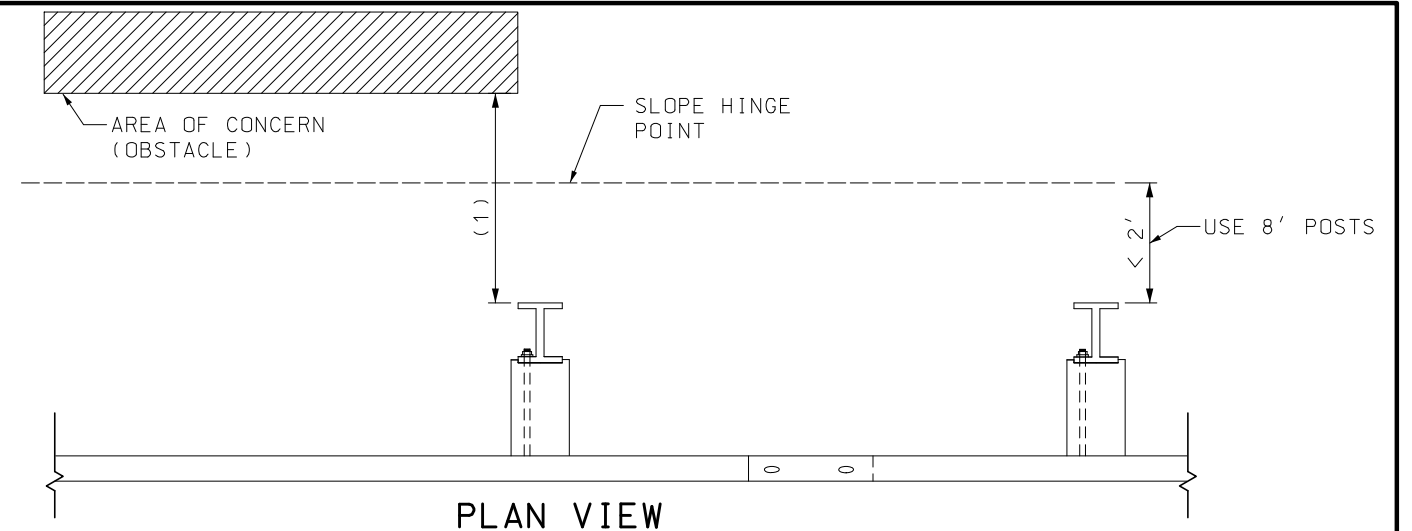
|                                                                                                                                                                                                                                  |                                                                       |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                       |                |
| <br>THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY.                                                                      | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>SPECIAL INSTALLATIONS</b> |                |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                  | <b>606.50F</b> |



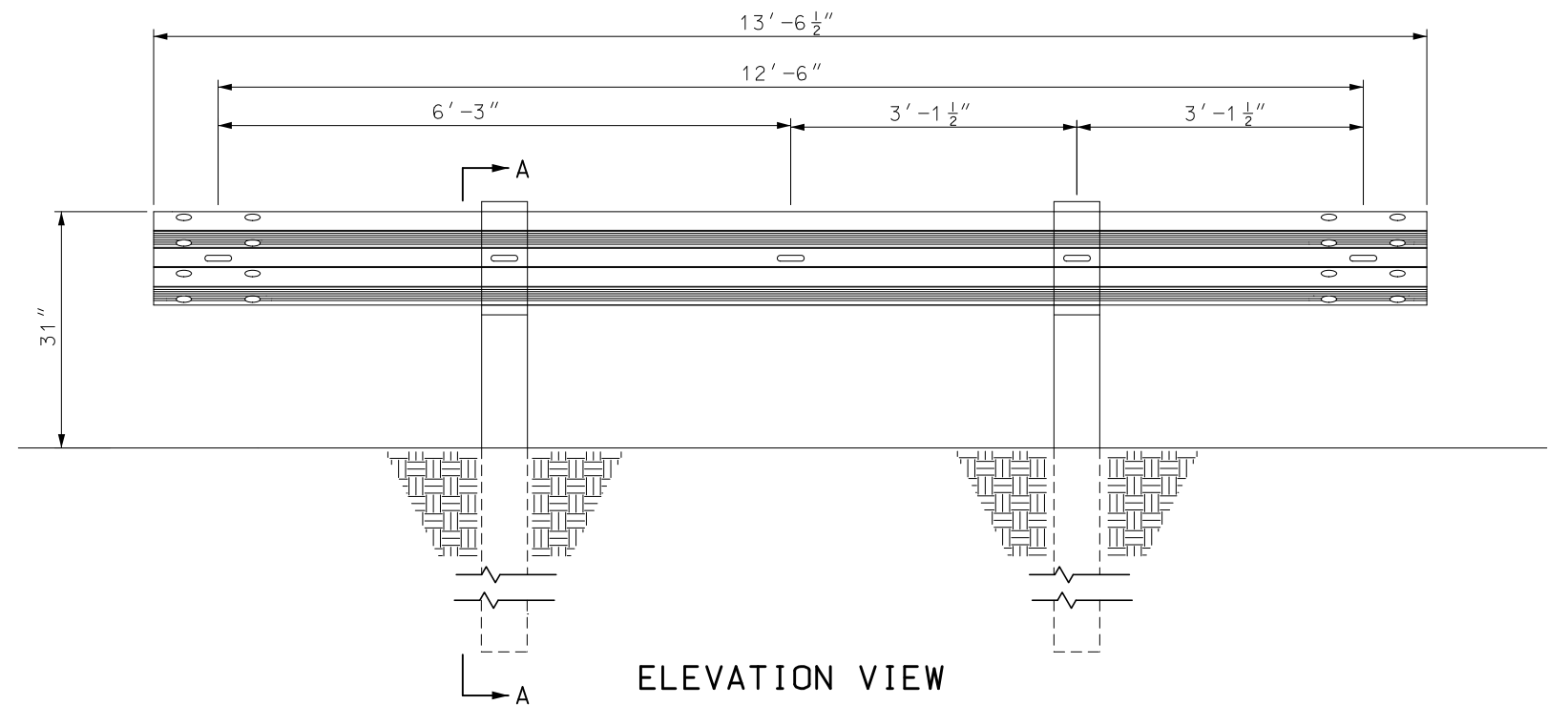
SECTION A-A  
8' STEEL POST



ALTERNATE SECTION A-A  
MAXIMUM LATERAL PLACEMENT OF  
8' STEEL POSTS ON SLOPES



PLAN VIEW



ELEVATION VIEW

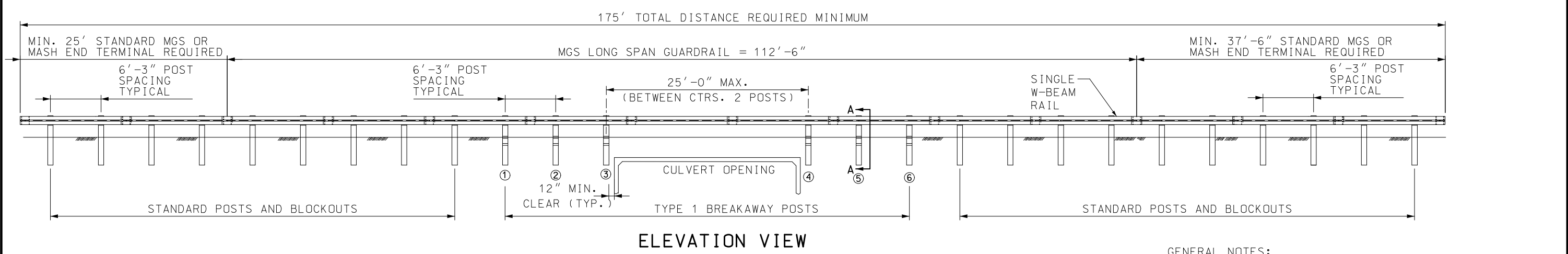
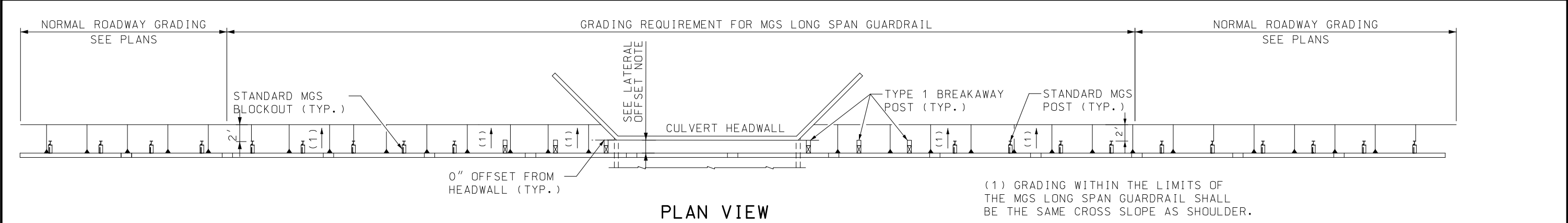
- (1) 3'-6" MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 8' POSTS AND A 2:1 OR FLATTER SLOPE.
- (2) WHERE THERE IS NOT SUFFICIENT EMBANKMENT BEYOND THE SHOULDER TO PLACE THE GUARDRAIL POST, THE POST MAY BE PLACED A MAXIMUM OF 12" BEYOND THE SLOPE BREAK POINT OF A 2:1 OR FLATTER SLOPE.

GENERAL NOTES:

8-FOOT POSTS SHALL BE USED WHEN LESS THAN 2 FEET OF EMBANKMENT IS PRESENT BETWEEN THE BACK OF THE GUARDRAIL POST AND THE SLOPE BREAK POINT. THE SUBSTITUTION OF 8-FOOT POSTS IN LIEU OF REQUIRED GRADING, TO CONSTRUCT LESS THAN THE DESIGNED TYPICAL SECTION, SHALL NOT BE ALLOWED.

8-FOOT POSTS CANNOT BE USED WHEN POST SPACING IS LESS THAN 6'-3", WITHIN VERTICAL BARRIER OR BRIDGE APPROACH TRANSITIONS, OR WITHIN CRASHWORTHY END TERMINALS.

|                                                                                                                                                                                                                                  |                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                             |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>8-FOOT POST</b> |
| DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                                                                                                                                                                             | SHEET NO.<br><b>606.50F</b> <b>6 OF 9</b>                   |



GENERAL NOTES:

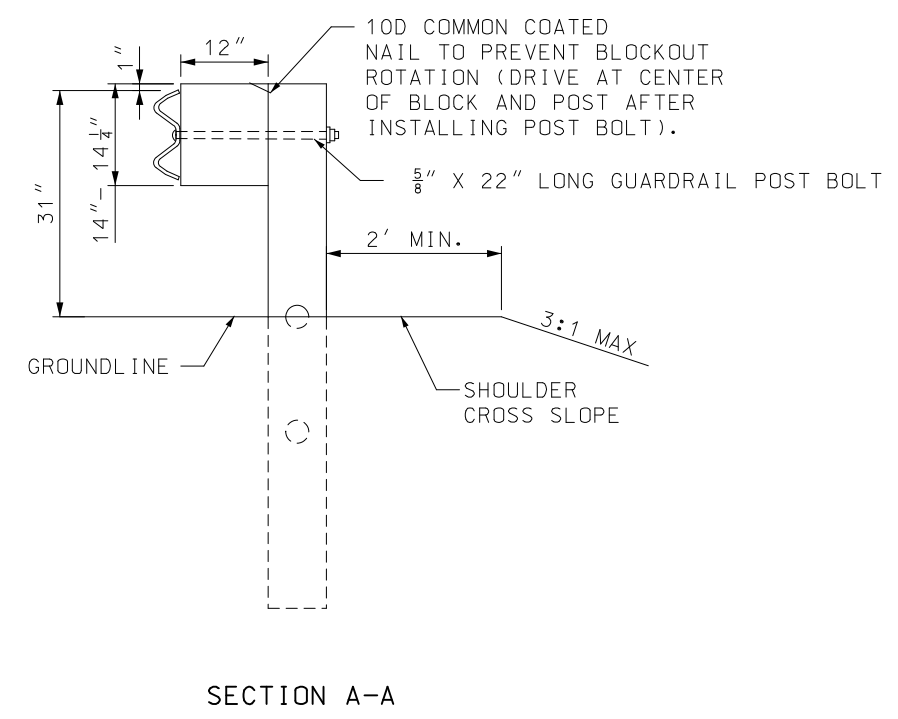
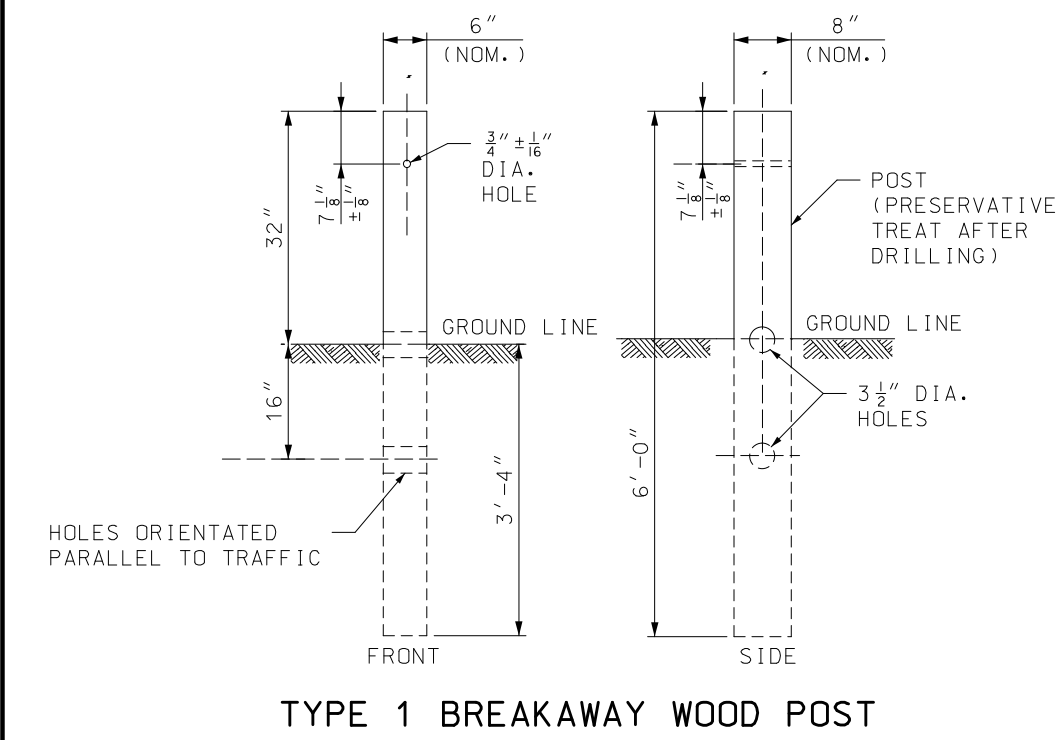
A MINIMUM LENGTH OF STANDARD MGS GUARDRAIL OR AN END TERMINAL IS REQUIRED BEFORE AND AFTER THE 112'-6" OF MGS LONG SPAN TO MAINTAIN STABILITY IN THE SYSTEM. 8' POSTS MAY BE USED OUTSIDE THE GRADING LIMITS SHOWN.

USE TYPE 1 BREAKAWAY WOOD POST FOR POSTS NO. 1-6. ALL OTHER POSTS SHALL BE W6X8.5 OR W6X9 STEEL POSTS.

WHEN THE HEADWALL IS FLUSH WITH THE GRADE, THE BACK OF THE POST CAN BE ALIGNED WITH THE NEAR SIDE OF THE HEADWALL. BUT IF THE HEADWALL CONTINUES ABOVE GRADE, THE SYSTEM SHOULD BE OFFSET 8' FROM THE FIXED OBJECT.

FOR LOCATIONS WHERE A GUARDRAIL FLARE IS DESIRED, THE SYSTEM SHOULD REMAIN TANGENT FOR 50'-0" BEFORE POST 1 OR AFTER POST 6, AT WHICH POINT THE GUARDRAIL MAY FLARE AT A MAXIMUM TAPER RATE OF 7:1.

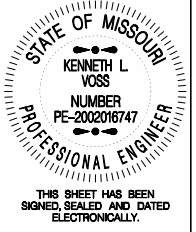
ALL POSTS, BLOCK, RAILS, AND HARDWARE SHALL COMPLY WITH SEC 606 AND AS DETAILED ON THIS STANDARD.





**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

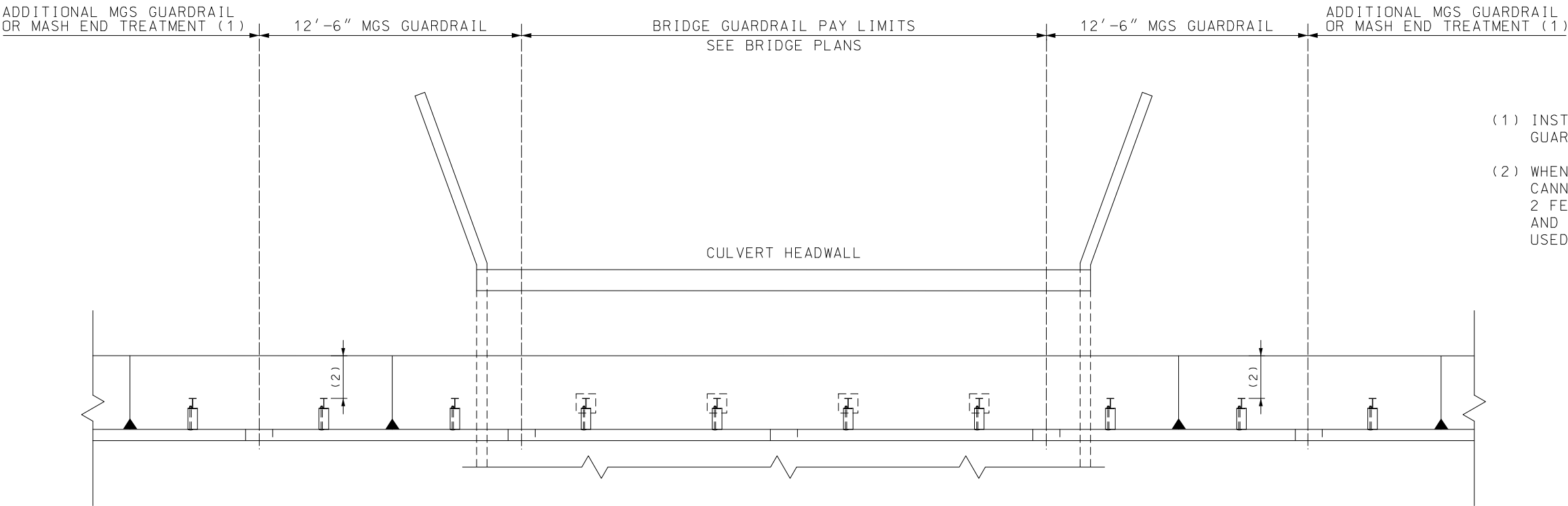


**MIDWEST GUARDRAIL SYSTEM (MGS)**

**LONG SPAN GUARDRAIL**

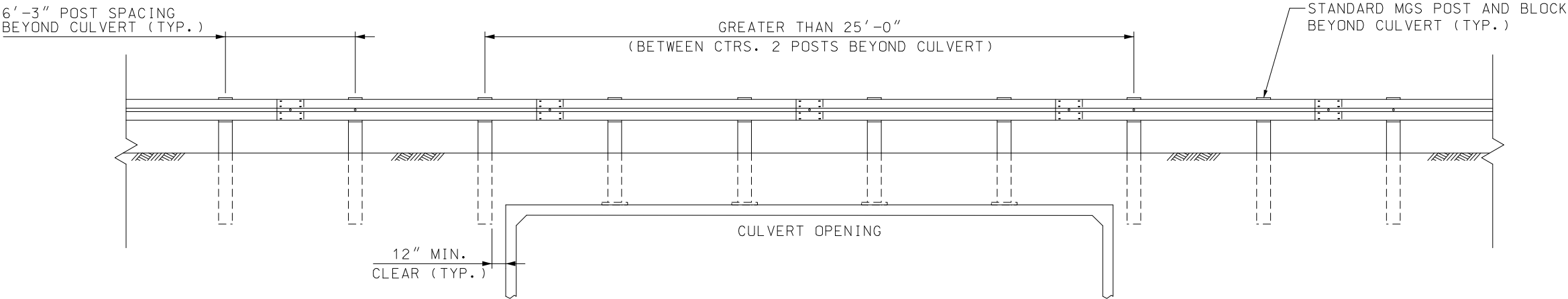
|                 |           |         |                     |
|-----------------|-----------|---------|---------------------|
| DATE EFFECTIVE: | 7/1/2024  | 606.50F | SHEET NO.<br>7 OF 9 |
| DATE PREPARED:  | 4/10/2024 |         |                     |





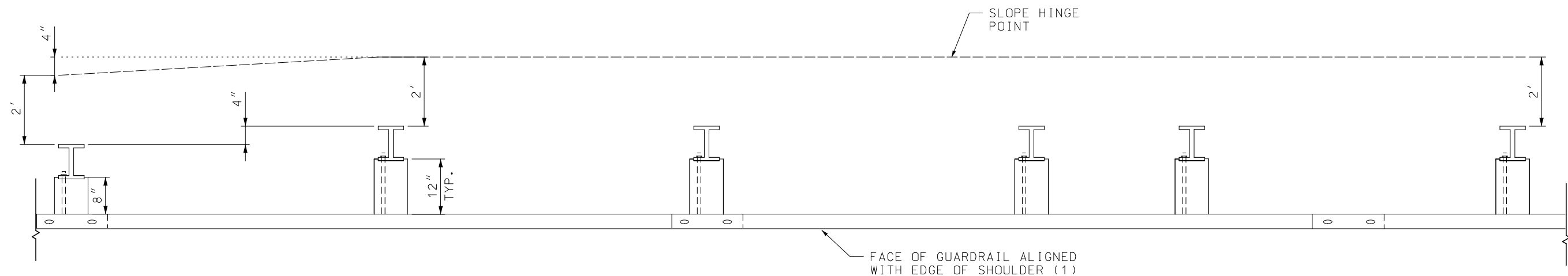
PLAN VIEW

- (1) INSTALL A MINIMUM OF 37'-6" OF ADDITIONAL MGS GUARDRAIL BEFORE STARTING A TAPER OR RADIUS.
- (2) WHEN SITE CONSTRAINTS PROHIBIT OR EMBANKMENT CANNOT BE CONSTRUCTED TO PROVIDE A MINIMUM OF 2 FEET BETWEEN THE BACK OF THE GUARDRAIL POST AND SLOPE BREAK POINT, 8 FOOT POSTS SHALL BE USED (SEE SHEET 6).

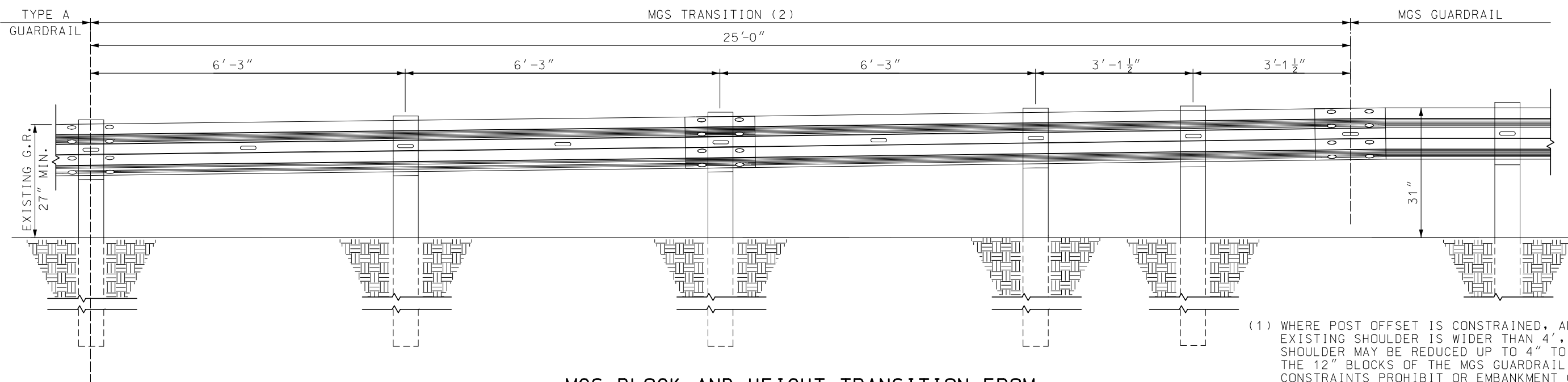


ELEVATION VIEW

|                                                                                                                                                                                                                                  |                                                                       |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                       |         |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <b>MIDWEST GUARDRAIL SYSTEM<br/>(MGS)<br/>ON CONCRETE BOX CULVERT</b> |         |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                  | 606.50F |



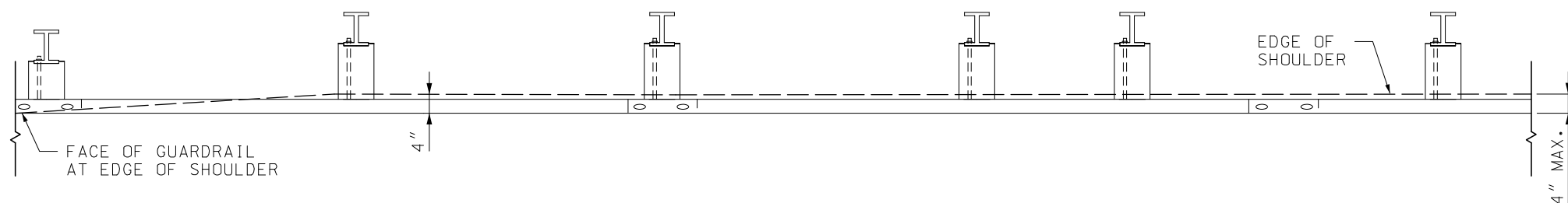
PLAN VIEW



MGS BLOCK AND HEIGHT TRANSITION FROM TYPE A GUARDRAIL TO MGS GUARDRAIL

(1) WHERE POST OFFSET IS CONSTRAINED, AND WHEN THE EXISTING SHOULDER IS WIDER THAN 4', THE EXISTING SHOULDER MAY BE REDUCED UP TO 4" TO ACCOMMODATE THE 12" BLOCKS OF THE MGS GUARDRAIL. WHERE SITE CONSTRAINTS PROHIBIT OR EMBANKMENT CANNOT BE CONSTRUCTED TO PROVIDE A MINIMUM OF 2' BETWEEN THE BACK OF THE GUARDRAIL POST AND SLOPE BREAK POINT, 8' POSTS SHALL BE USED (SEE SHEET 6). THE SUBSTITUTION OF 8' POSTS IN LIEU OF REQUIRED GRADING SHALL NOT BE ALLOWED.

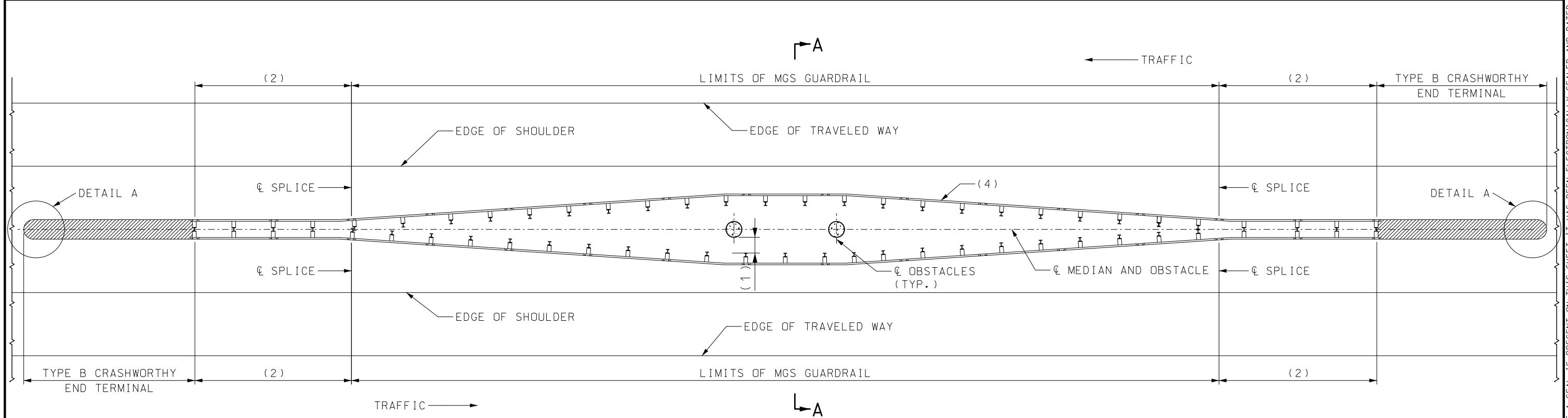
(2) MGS TRANSITION FROM TYPE A GUARDRAIL SHALL BE COMPLETED OUTSIDE THE 50' MGS END TERMINAL LIMITS.



ALTERNATE PLAN VIEW - ALIGNMENT TAPER

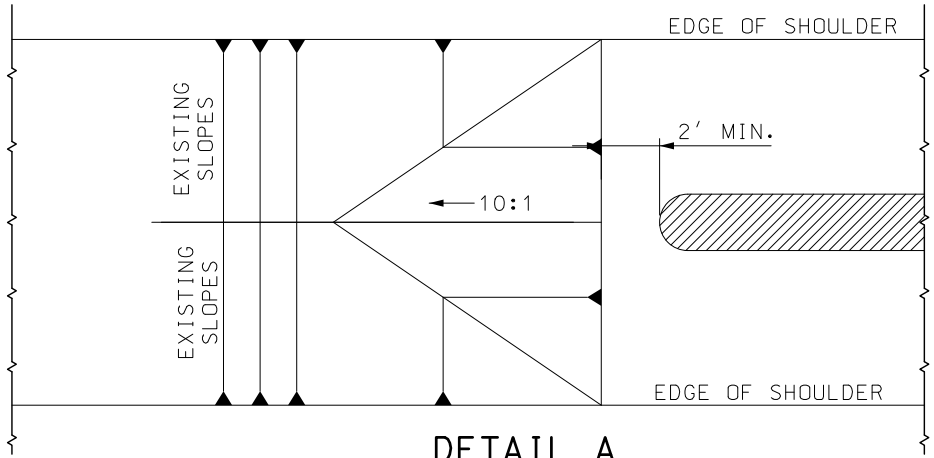
SEE NOTE (1)

|                                                                                                                                                                                                                                                                       |                                                                             |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                      |                                                                             |         |
|  <p>STATE OF MISSOURI<br/>KENNETH L. VOSS<br/>NUMBER<br/>PE-2002016747<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>BLOCK AND HEIGHT TRANSITION</b> |         |
|                                                                                                                                                                                                                                                                       | DATE EFFECTIVE: 7/1/2024<br>DATE PREPARED: 4/10/2024                        | 606.50F |

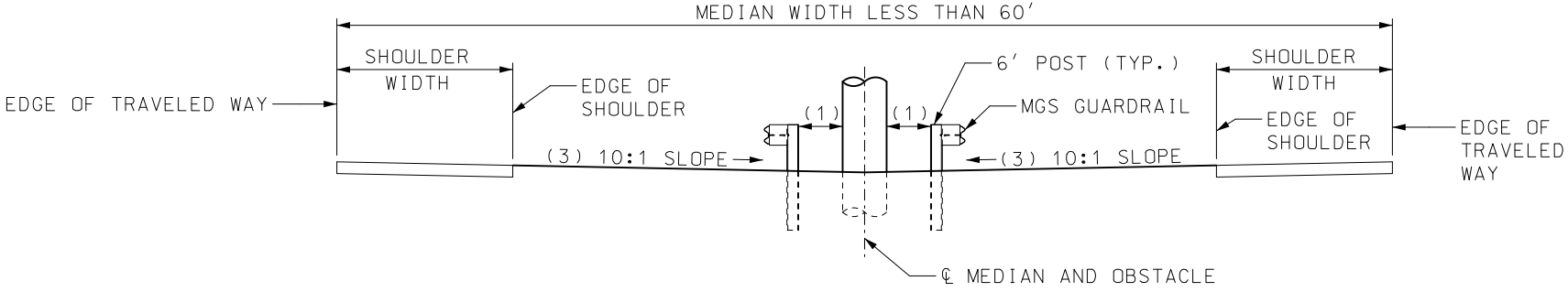


PIER AT  $\phi$  MEDIAN

- (1) 2'-6" MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 6'-3" POST SPACING IS PREFERRED  
2'-0" MINIMUM CLEARANCE USE 3'-1 1/2" POST SPACING  
1'-6" MINIMUM CLEARANCE USE 1'-6 3/4" POST SPACING  
SEE STD. PLANS 606.50 FOR POST SPACING DETAILS.
- (2) TRANSITION DOUBLE FACED GUARDRAIL HEIGHT AND WIDTH IF NEEDED FOR TYPE B CRASHWORTHY END TERMINAL PER MANUFACTURER'S REQUIREMENTS. SEE STD. PLANS 606.50 FOR HEIGHT TRANSITION DETAILS.
- (3) CONTINUE 10:1 SLOPE TO OBSTACLE OR A MINIMUM OF 2' PAST THE BACK OF THE GUARDRAIL POST.
- (4) 15:1 FLARE RATE OR AS RECOMMENDED BY TABLE 5-9 OF THE LATEST VERSION OF THE "ROADSIDE DESIGN GUIDE".



DETAIL A  
(GRADING LIMITS)

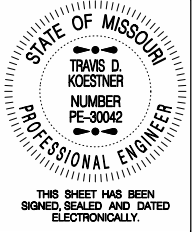


SECTION A-A

GENERAL NOTE:  
TYPE B CRASHWORTHY END TERMINAL SHALL BE MGS COMPATIBLE, LATEST VERSION AND SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.



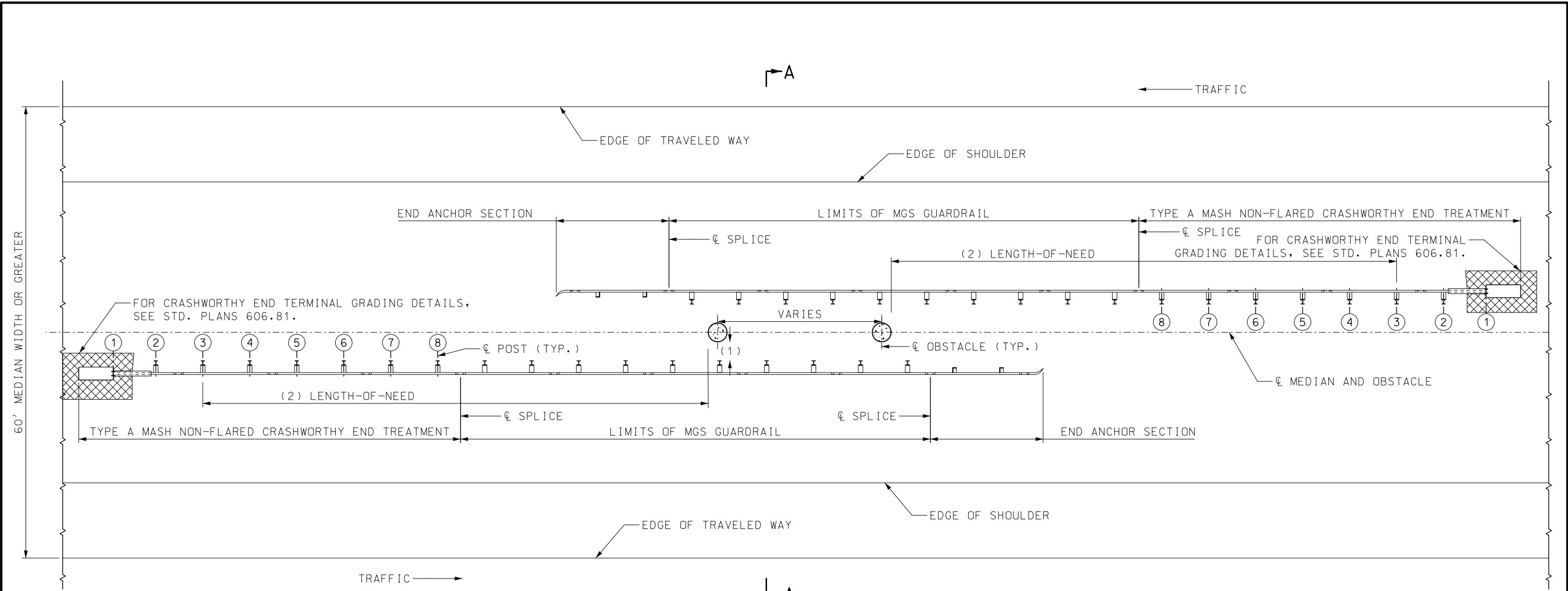
**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**MGS GUARDRAIL MEDIAN PIER PROTECTION**  
MEDIAN LESS THAN 60'

|                            |               |                     |
|----------------------------|---------------|---------------------|
| DATE EFFECTIVE: 04/01/2021 | <b>606.51</b> | SHEET NO.<br>1 OF 2 |
| DATE PREPARED: 1/27/2021   |               |                     |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

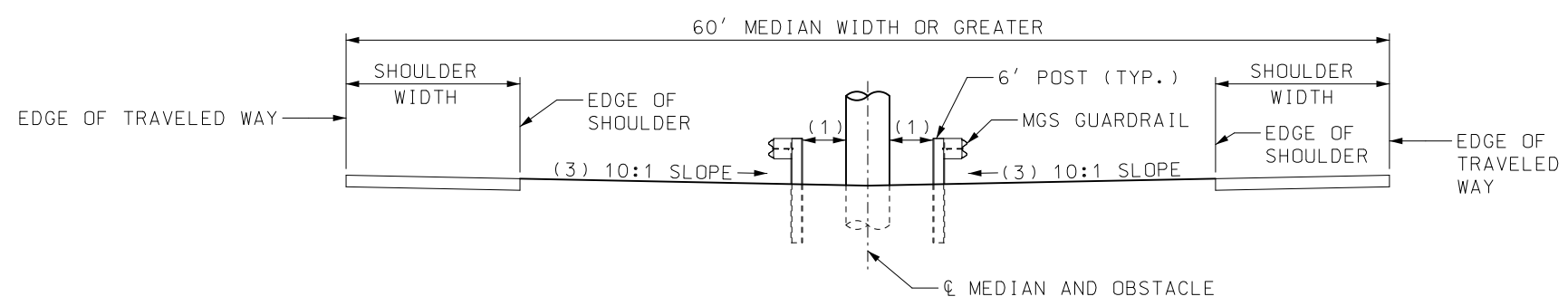


PIER AT CL MEDIAN

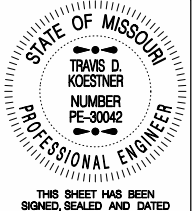
- (1) 2'-6" MINIMUM CLEARANCE TO THE FACE OF OBSTACLE WITH 6'-3" POST SPACING IS PREFERRED  
2'-0" MINIMUM CLEARANCE USE 3'-11#2" POST SPACING  
1'-6" MINIMUM CLEARANCE USE 1'-63#4" POST SPACING  
SEE STD. PLANS 606.50 FOR POST SPACING DETAILS.
- (2) FOR LENGTH-OF-NEED, SEE THE LATEST VERSION OF THE "ROADSIDE DESIGN GUIDE 5.6.4 LENGTH-OF-NEED".
- (3) CONTINUE 10:1 SLOPE TO OBSTACLE OR A MINIMUM OF 2' PAST THE BACK OF THE GUARDRAIL POST.

GENERAL NOTE:  
MEDIAN WIDTHS GREATER THAN 60' THAT THE PIER OBSTACLES ARE BEYOND THE CLEAR-ZONE DO NOT REQUIRE MEDIAN PIER PROTECTION. FOR CLEAR-ZONE DISTANCES, SEE THE LATEST VERSION OF THE "ROADSIDE DESIGN GUIDE 3.1 THE CLEAR-ZONE CONCEPT".

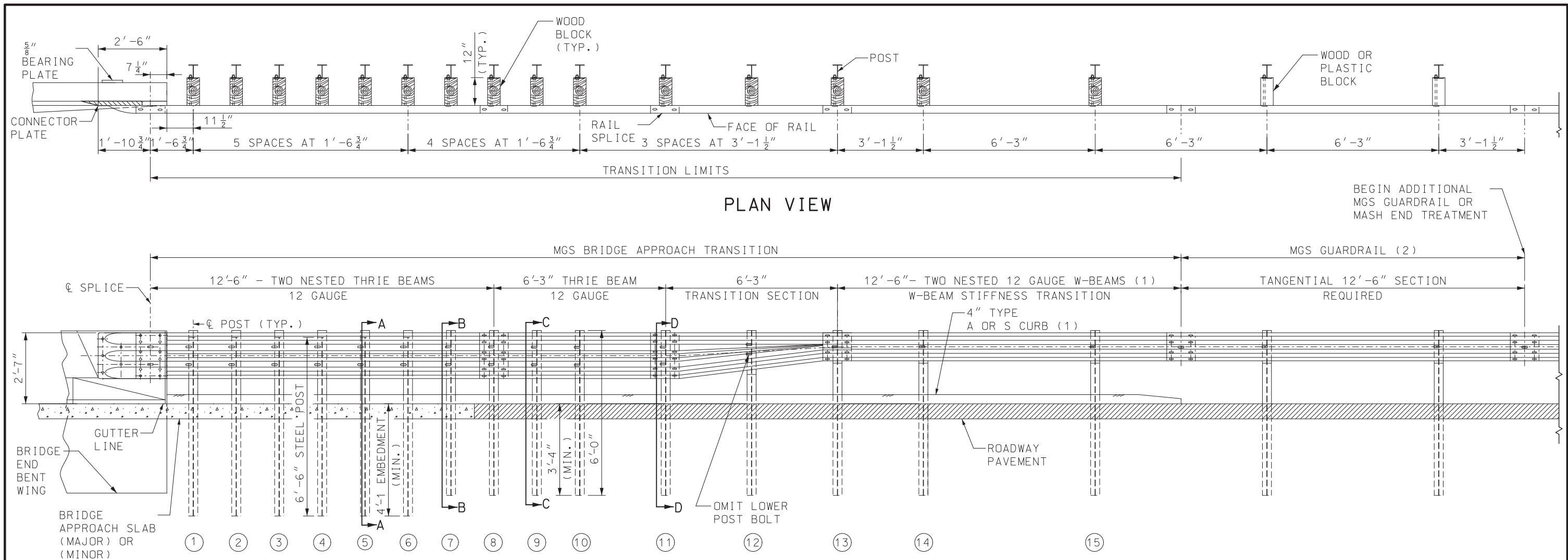
TYPE A NON-FLARED CRASHWORTHY END TERMINAL SHALL BE THE LATEST VERSION AND SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.



SECTION A-A

|                                                                                                                                                                                                                                  |                                                                      |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                      |               |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>MGS GUARDRAIL MEDIAN PIER PROTECTION</b><br>60' MEDIAN OR GREATER |               |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 04/01/2021<br>DATE PREPARED: 1/27/2021               | <b>606.51</b> |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



# GENERAL NOTES:

MGS GUARDRAIL SHALL BE TANGENTIAL WITH BRIDGE APPROACH TRANSITION FOR 12'-6" BEYOND THE TWO NESTED W-BEAM STIFFNESS TRANSITION AND 25'-0" BEYOND THRIE BEAM TRANSITION SECTION.

AT THE CONTRACTORS OPTION, A SINGLE 18'-9" PIECE OF THRIE BEAM MAY BE SUBSTITUTED FOR ONE OF THE 12'-6" PANELS AND THE 6'-3" SECTION AS SHOWN.

FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SEC 1040 OF THE STANDARD SPECIFICATIONS.

RAIL POSTS SHALL BE SET PERPENDICULAR TO THE ROADWAY PROFILE GRADE AND VERTICALLY IN CROSS SECTION.

USE 5/8" BUTTON-HEAD OVAL SHOULDER BOLTS WITH HEX NUTS AT ALL SLOTS (THICKNESS OF HEX NUTS = 3/8" MIN.).

THE BEARING PLATE SHALL BE FABRICATED FROM GRADE A36 STEEL AND GALVANIZED.

ALL LAP SPLICES, INCLUDING END SHOES, SHALL BE MADE IN THE DIRECTION OF TRAFFIC.

THE COST OF FURNISHING, FABRICATING AND INSTALLING BRIDGE APPROACH TRANSITION (EXTENDED CURB), COMPLETE IN PLACE, WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

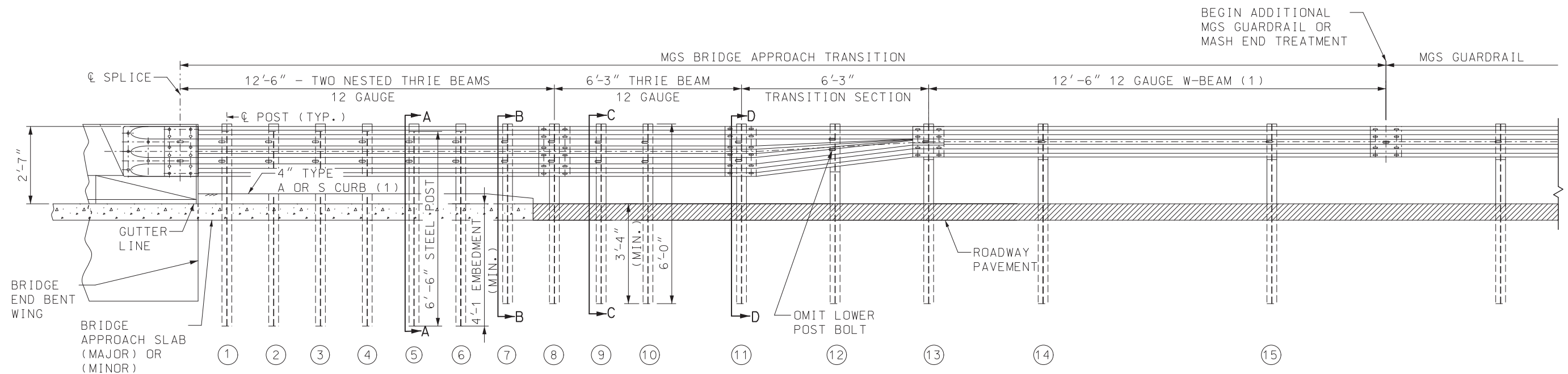
## BRIDGE APPROACH TRANSITION (EXTENDED CURB)(1)

THE CONTRACTOR MAY, AT THEIR OPTION, FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A769 GRADE 36 OR 40. THE SECTIONS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH REQUIREMENTS OF AASHTO M 111.

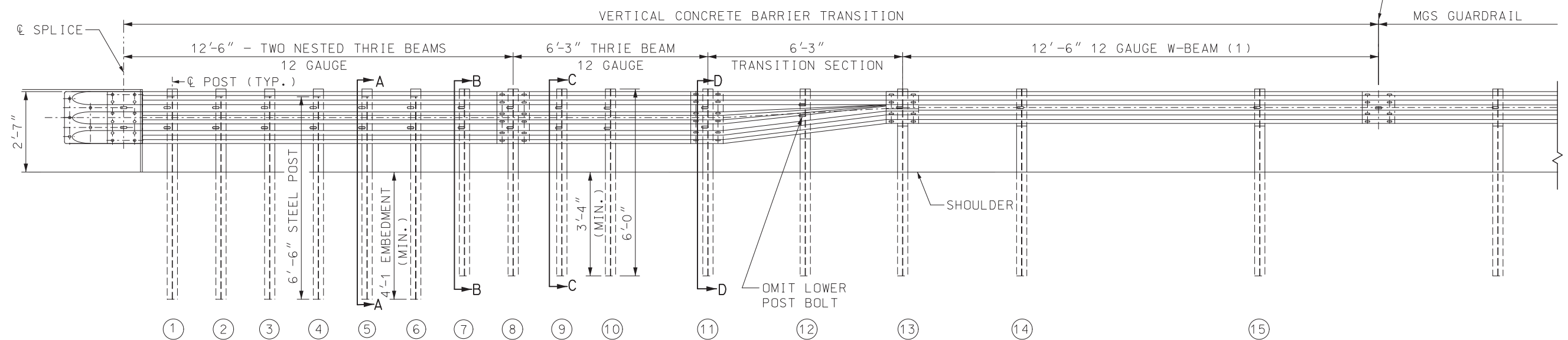
(1) WHERE CURB EXTENDS UPSTREAM OF POST NO. (11) FOR DRAINAGE PURPOSES, A STIFFNESS TRANSITION CONSISTING OF AN EXTRA 12'-6" BEAM OF 12 GAUGE W-BEAM MUST BE NESTED PRIOR TO THE TRANSITION SECTION (UPSTREAM OF POST NO. (13)). THE CURB SHALL BE EXTENDED TO THE END OF THE 12'-6" 12 GAUGE W-BEAM STIFFNESS TRANSITION SEE STD. PLAN 609.40 FOR DETAILS. WHEN CURBS DO NOT EXTEND UPSTREAM OF POST NO. (11), PAY FOR A BRIDGE APPROACH TRANSITION (REGULAR CURB/NO CURB). FOR DETAILS OF BRIDGE APPROACH TRANSITION (REGULAR CURB/NO CURB), SEE SHEET 2 OF 6.

(2) THE ADDITIONAL REQUIRED MGS GUARDRAIL IS INCLUDED IN THE TOTAL LENGTH OF NEED AND SHALL BE PAID FOR AS A GUARDRAIL PAY ITEM.

|                                                                                                                                                                                                                                  |                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                      |
| <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br>VERTICAL BARRIER TRANSITIONS                                                                                                                                                            |                                                      |
|                                                                                                                                             | DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/21/2025 |
| 606.60C                                                                                                                                                                                                                          | SHEET NO.<br>1 OF 6                                  |



BRIDGE APPROACH TRANSITION (WITH REGULAR LENGTH CURB OR NO CURB)(1)

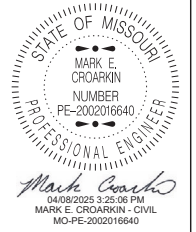


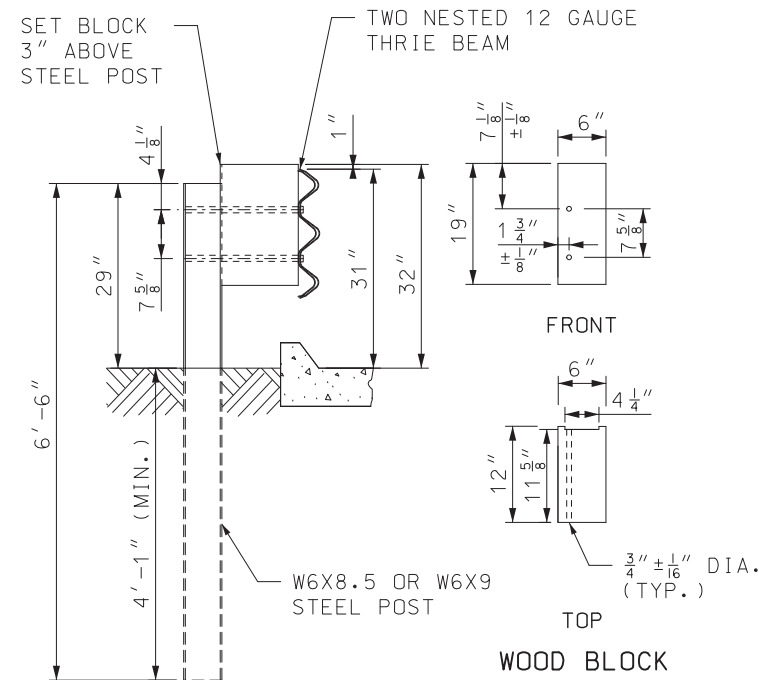
VERTICAL CONCRETE BARRIER TRANSITION (REGULAR LENGTH CURB OR NO CURB)(1)  
(VIEW SHOWN WITHOUT CURB)

GENERAL NOTES:  
SEE SHEET 1 FOR ADDITIONAL NOTES NOT INCLUDED ON THIS SHEET.

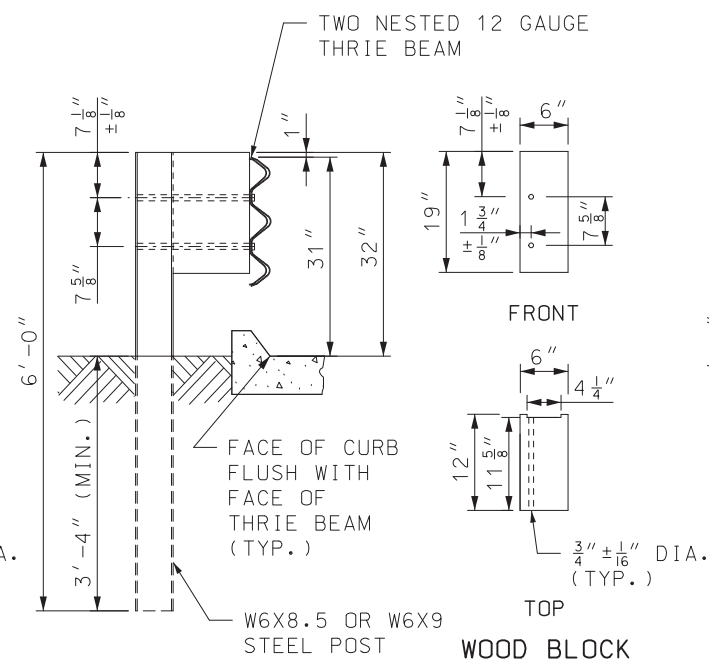
THE COST OF FURNISHING, FABRICATING AND INSTALLING  
BRIDGE APPROACH TRANSITION (REGULAR/NO CURB), COMPLETE  
IN PLACE, WILL BE PAID FOR AT THE CONTRACT UNIT  
PRICE PER EACH.

(1) WHERE CURB EXTENDS UPSTREAM OF POST NO. (11) FOR DRAINAGE PURPOSES,  
A STIFFNESS TRANSITION CONSISTING OF AN EXTRA 12'-6" BEAM OF 12  
GAUGE W-BEAM MUST BE NESTED PRIOR TO THE TRANSITION SECTION  
(UPSTREAM OF POST NO. (13)). THE CURB SHALL BE EXTENDED TO THE END  
OF THE 12'-6" 12 GAUGE W-BEAM STIFFNESS TRANSITION SEE STD. PLAN  
609.40 FOR DETAILS. IF CURB EXTENDS BEYOND POST NO. (11), PAY FOR  
A BRIDGE APPROACH TRANSITION (EXTENDED CURB). FOR DETAILS OF  
BRIDGE APPROACH TRANSITION (EXTENDED CURB), SEE SHEET 1 OF 6.

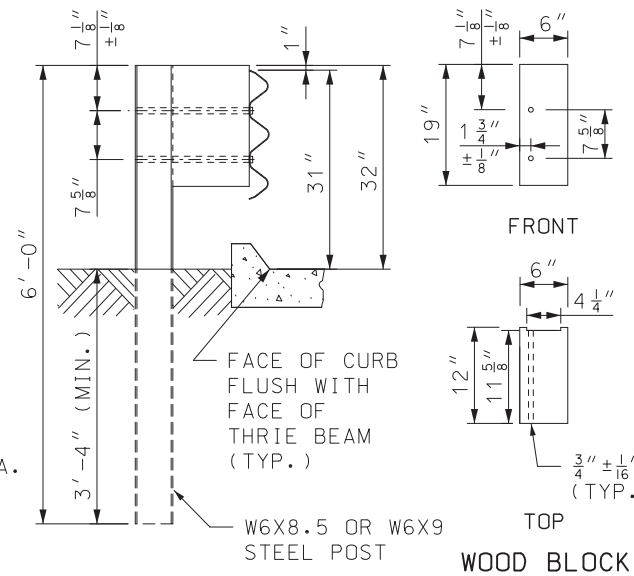
|                                                                                                                                                                                                                                  |                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                              |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>VERTICAL BARRIER TRANSITIONS</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/21/2025                                                                                                                                                                             | <b>606.60C</b>                                                               |
| SHEET NO. <b>2 OF 6</b>                                                                                                                                                                                                          |                                                                              |



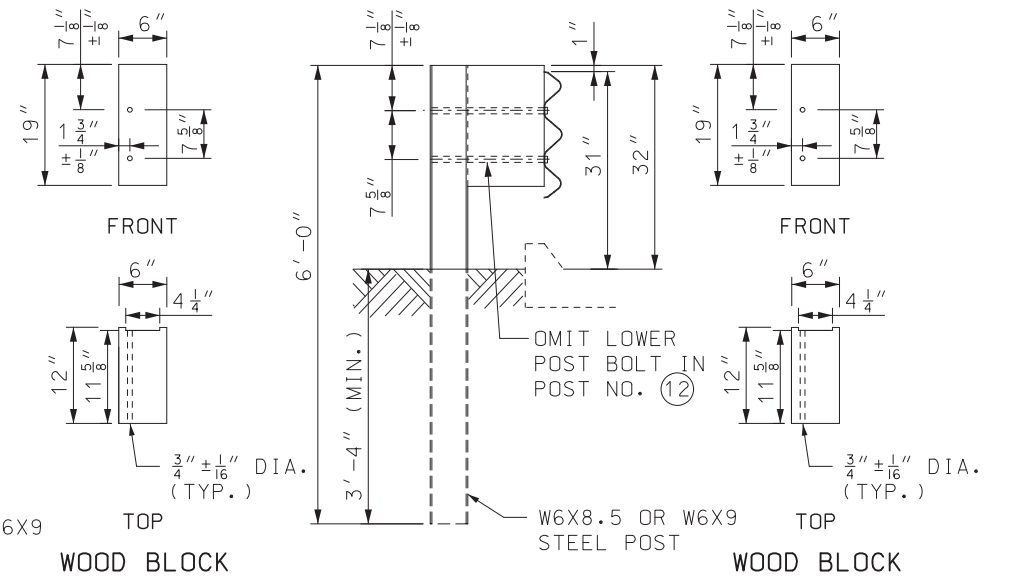
SECTION A-A



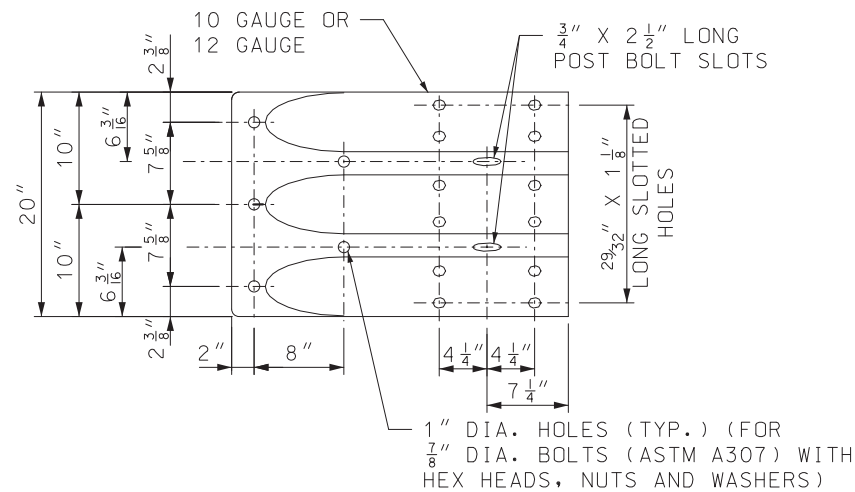
SECTION B-B



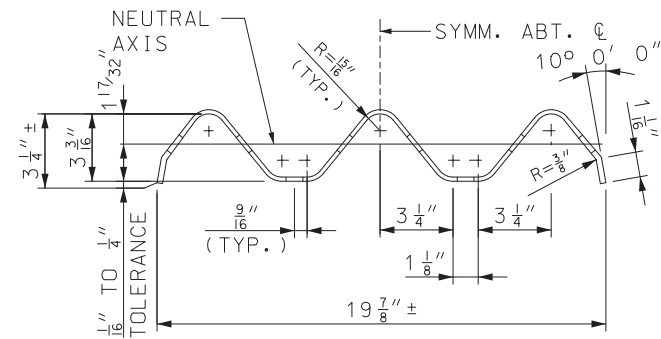
SECTION C-C



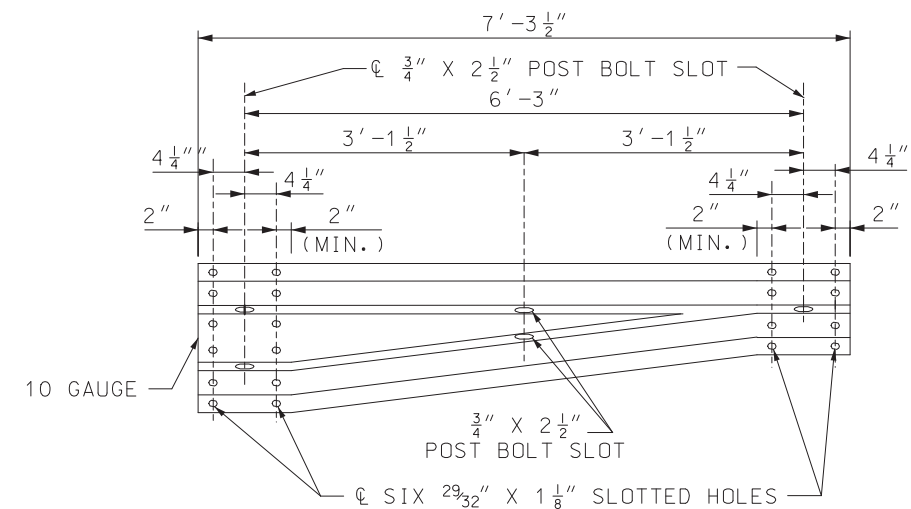
SECTION D-D



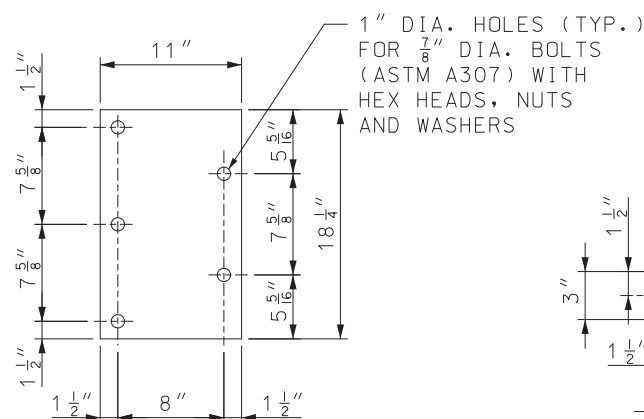
TERMINAL CONNECTOR



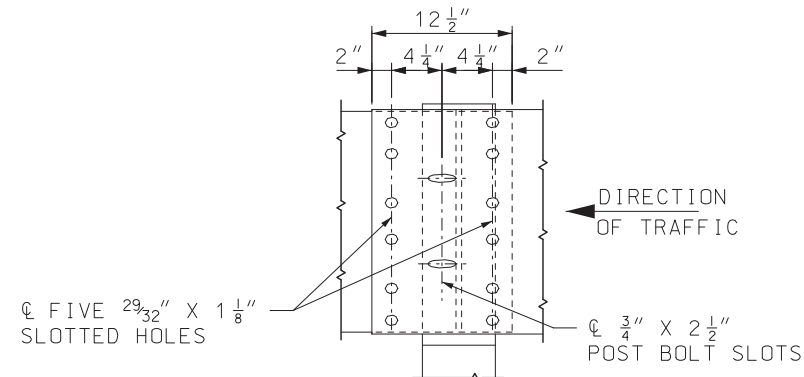
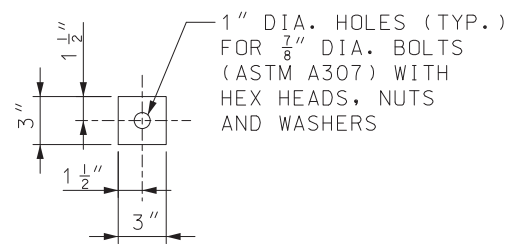
SECTION THROUGH THRIE BEAM RAIL



TRANSITION SECTION

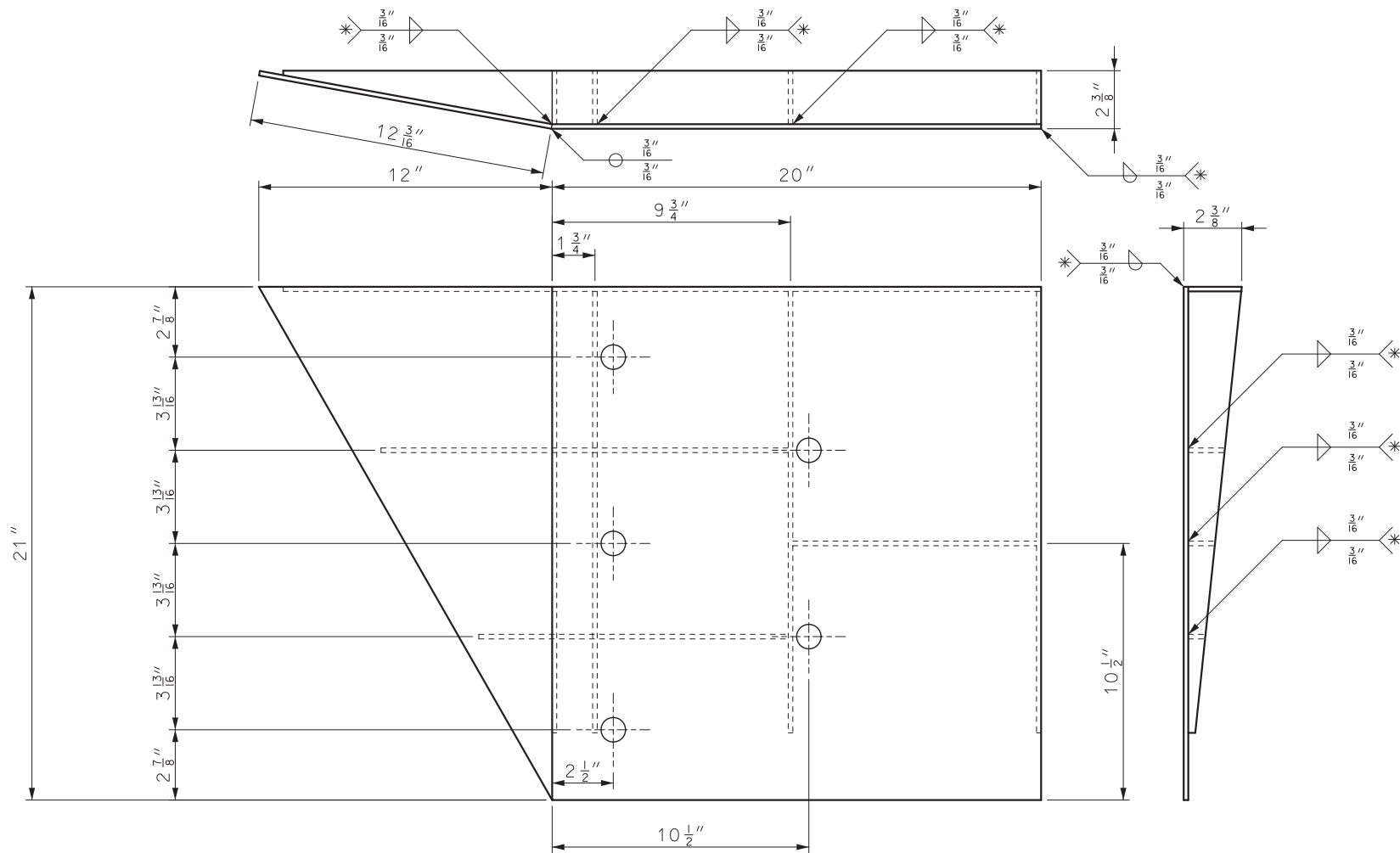


OPTIONAL 5/8" BEARING PLATE  
(5 REQUIRED)



THRIE BEAM RAIL SPLICE AT POST

|                                                                                                                                                                                                                                  |                                                                       |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                       |         |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br>VERTICAL BARRIER TRANSITIONS |         |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/21/2025                  | 606.60C |



### WELDING INSTRUCTION

\* ALL FILLET WELDS SHALL BE 1" LONG SPACED AT 2".

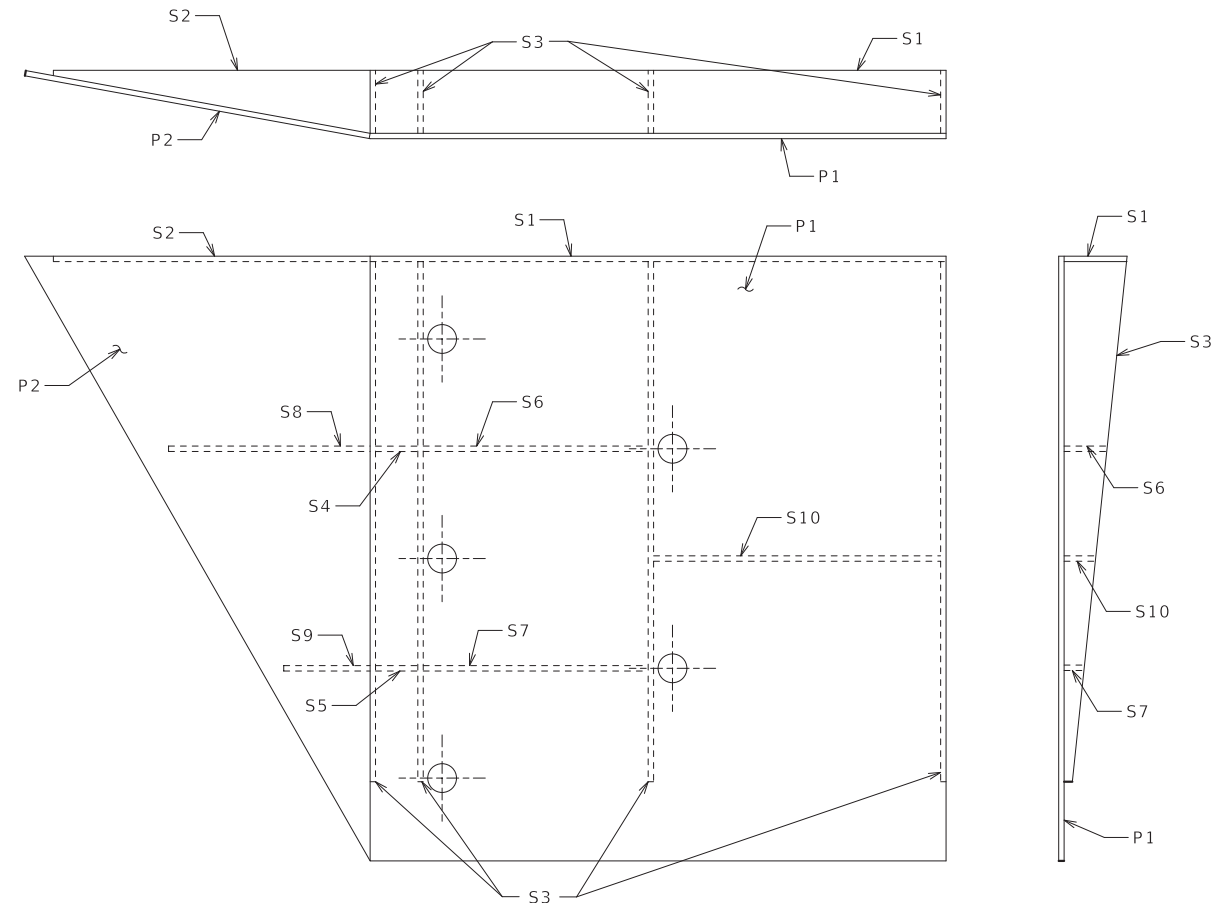


PLATE AND STIFFENER IDENTIFICATION

| CONNECTOR PLATE DIMENSIONS<br>(PER ASSEMBLY) |          |       |                          |
|----------------------------------------------|----------|-------|--------------------------|
| PIECE                                        | QUANTITY | SHAPE | DIMENSIONS (A x B x C)   |
| P1                                           | 1        | B     | 20" x 21"                |
| P2                                           | 1        | B     | 21" x 12 3/16"           |
| S1                                           | 1        | B     | 20" x 2 3/16"            |
| S2                                           | 1        | B     | 11" x 2 3/16" x 3/16"    |
| S3                                           | 4        | B     | 18 1/4" x 2 3/16" x 1/4" |
| S4                                           | 1        | B     | 1 3/8" x 1 1/2"          |
| S5                                           | 1        | B     | 1 3/8" x 1 1/16"         |
| S6                                           | 1        | B     | 7 3/4" x 1 1/2"          |
| S7                                           | 1        | B     | 7 3/4" x 1 1/16"         |
| S8                                           | 1        | B     | 7" x 1 1/2" x 1/4"       |
| S9                                           | 1        | B     | 3" x 1 1/16" x 1/8"      |
| S10                                          | 1        | B     | 9 7/8" x 1 1/16"         |

### GENERAL NOTES:

COVER PLATE PANELS ARE  $\frac{3}{16}$ " THICK.

ALL STIFFENERS ARE  $\frac{1}{4}$ " THICK.

CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE A36 STEEL AND GALVANIZED.

FOR GALVANIZED REQUIREMENTS, SEE SEC 1040.

ALL HOLE DIAMETERS SHALL BE 1".

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

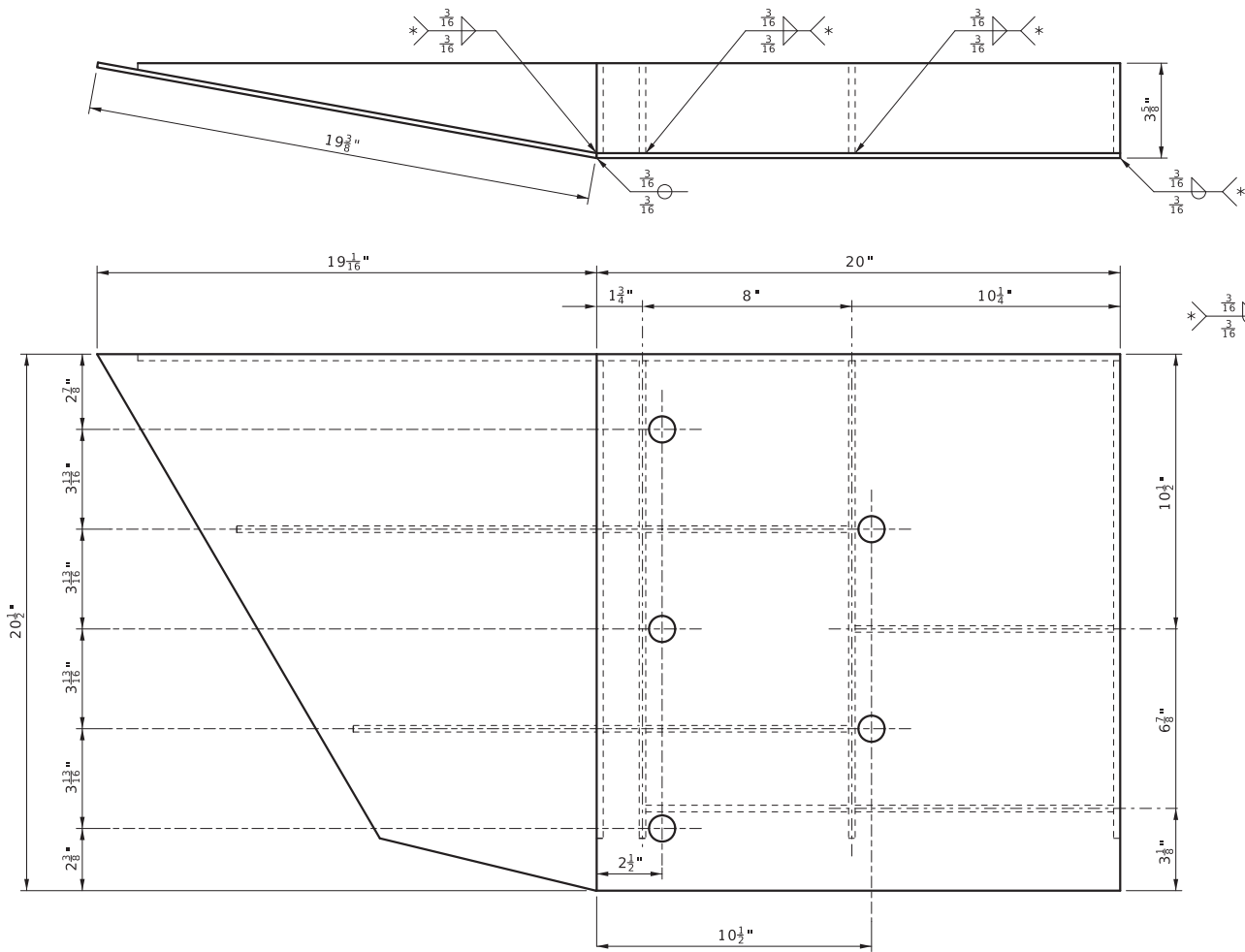
**MIDWEST GUARDRAIL SYSTEM (MGS)**  
**VERTICAL BARRIER TRANSITIONS (CONNECTOR PLATE DETAIL)**

DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/21/2025

606.60C

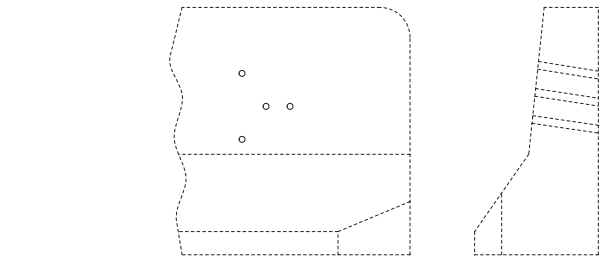
SHEET NO.  
4 OF 6



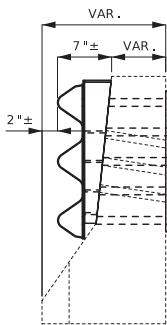


WELDING INSTRUCTIONS

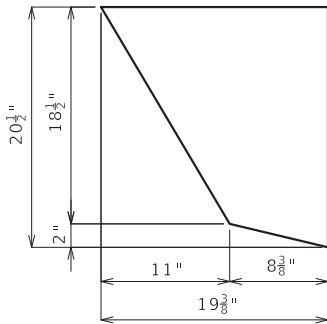
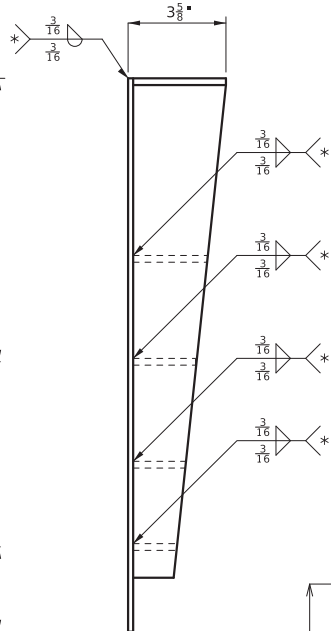
\* ALL FILLET WELDS SHALL BE 1" LONG SPACED AT 2".



1970s & 80s BARRIER END



INSTALLATION DETAIL



P2 DETAIL

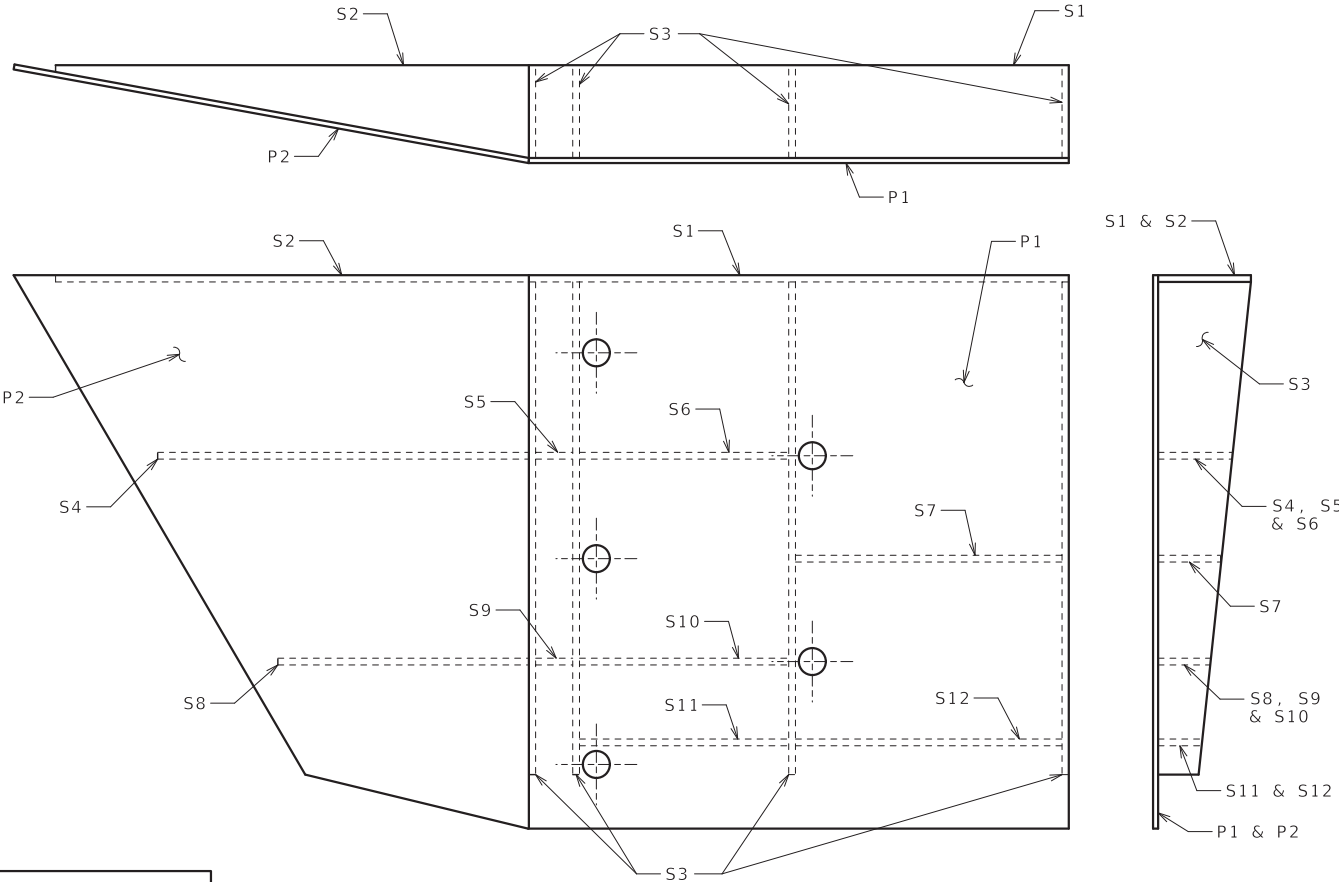


PLATE AND STIFFENER IDENTIFICATION

GENERAL NOTES:

COVER PLATE PANELS ARE  $\frac{3}{16}$ " THICK.

ALL STIFFENERS ARE  $\frac{1}{4}$ " THICK.

CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE A36 STEEL AND GALVANIZED.

FOR GALVANIZED REQUIREMENTS, SEE SEC 1040.

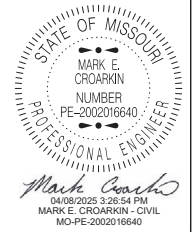
ALL HOLE DIAMETERS SHALL BE 1".

| CONNECTOR PLATE DIMENSIONS<br>(PER ASSEMBLY) |          |       |                          |
|----------------------------------------------|----------|-------|--------------------------|
| PIECE                                        | QUANTITY | SHAPE | DIMENSIONS (A x B x C)   |
| P1                                           | 1        |       | 20" x 20 1/2"            |
| P2                                           | 1        |       | SEE P2 DETAIL            |
| S1                                           | 1        |       | 20" x 2 3/16"            |
| S2                                           | 1        |       | 11" x 2 3/16" x 3/16"    |
| S3                                           | 4        |       | 18 1/4" x 2 3/16" x 1/4" |
| S4                                           | 1        |       | 1 3/8" x 1 1/2"          |
| S5                                           | 1        |       | 1 3/8" x 1 1/16"         |
| S6                                           | 1        |       | 7 3/4" x 1 1/2"          |
| S7                                           | 1        |       | 7 3/4" x 1 1/16"         |
| S8                                           | 1        |       | 7" x 1 1/2" x 1/4"       |
| S9                                           | 1        |       | 3" x 1 1/16" x 1/8"      |
| S10                                          | 1        |       | 9 7/8" x 1 1/16"         |



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

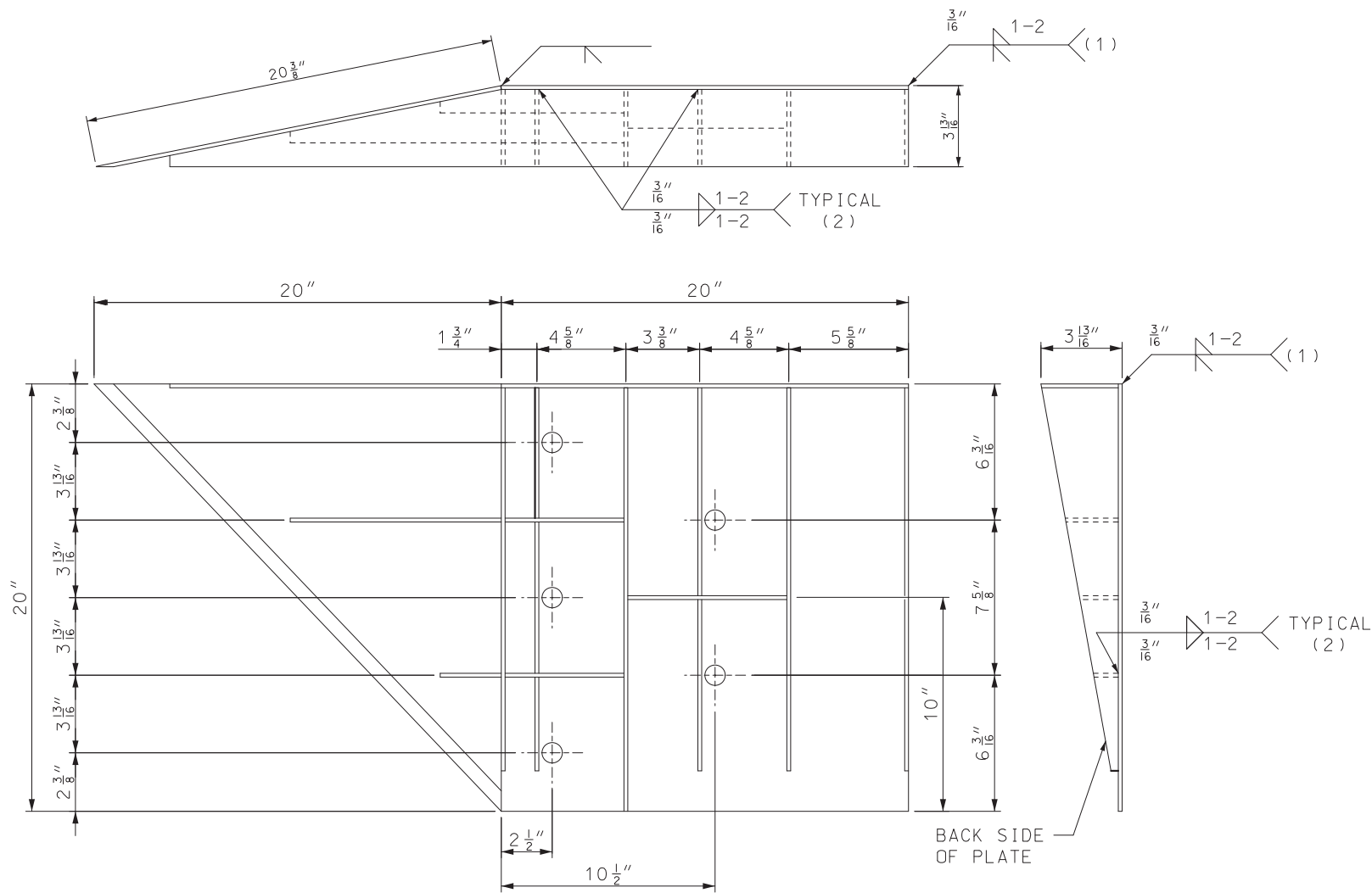
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**MIDWEST GUARDRAIL SYSTEM (MGS)**

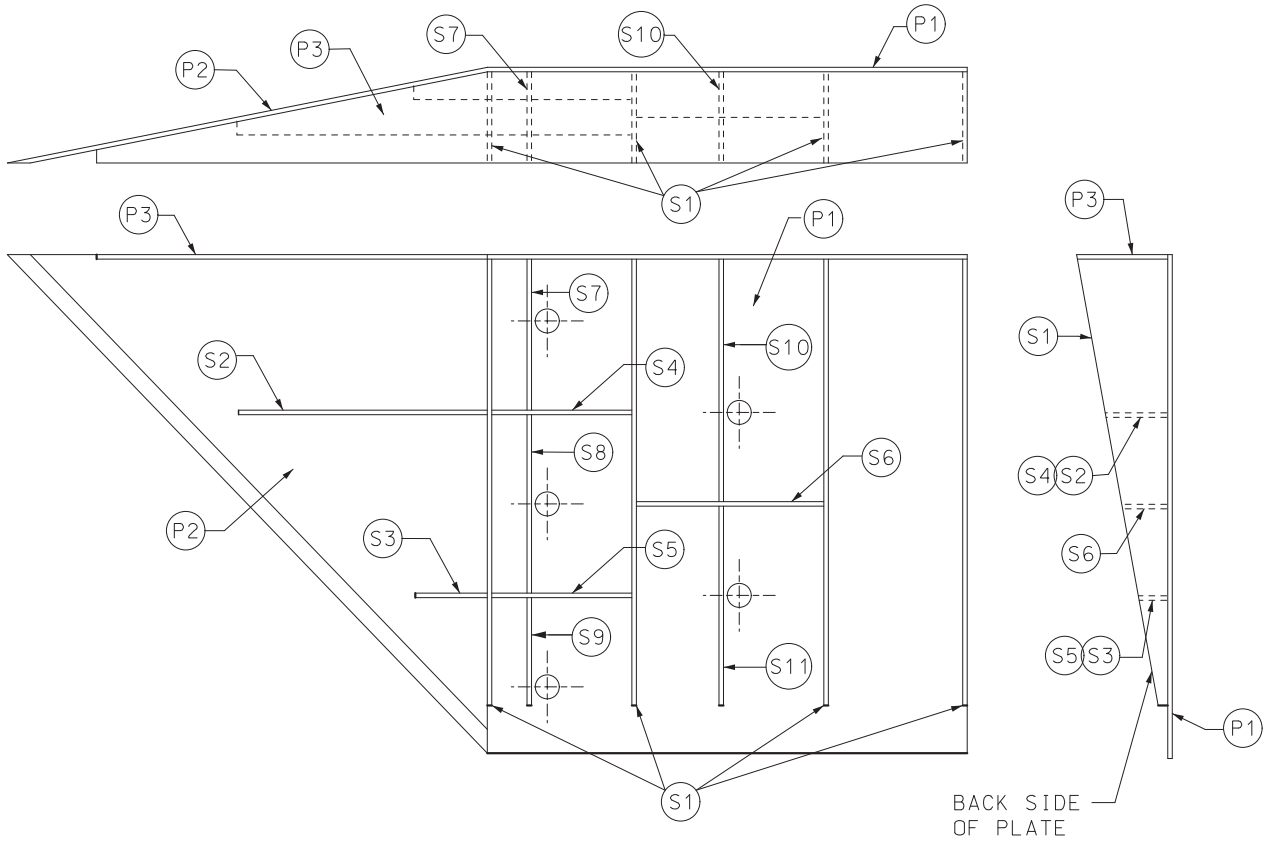
**VERTICAL BARRIER TRANSITIONS (1970s & 80s BARRIER CONNECTOR PLATE DETAIL)**

|                 |           |         |                     |
|-----------------|-----------|---------|---------------------|
| DATE EFFECTIVE: | 7/1/2025  | 606.60C | SHEET NO.<br>5 OF 6 |
| DATE PREPARED:  | 3/21/2025 |         |                     |



**WELDING INSTRUCTION**  
(VIEWED FROM BACK SIDE OF PLATE)

- (1) STIFFENERS LOCATED AT THE OUTSIDE EDGES OF THE COVER PLATES SHALL BE WELDED AS FOLLOWS:  
SINGLE BEVEL GROOVE WELD ON EXTERNAL SIDES AND  $\frac{3}{16}$ " FILLET WELD BY 1" LONG SPACED AT 2" ON INTERNAL SIDES.
- (2) STIFFENERS LOCATED ON THE INSIDE OF THE COVER PLATE SHALL BE WELDED AS FOLLOWS:  
 $\frac{3}{16}$ " FILLET WELD BY 1" LONG SPACED AT 2".



**PLATE AND STIFFENER IDENTIFICATION**  
(VIEWED FROM BACK SIDE OF PLATE)

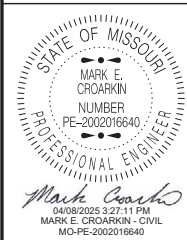
| CONNECTOR PLATE DIMENSIONS<br>(PER ASSEMBLY) |          |       |                                                                                 |
|----------------------------------------------|----------|-------|---------------------------------------------------------------------------------|
| PIECE                                        | QUANTITY | SHAPE | SIZE (A x B x C x D)                                                            |
| P1                                           | 1        | B     | 20" x 20"                                                                       |
| P2                                           | 1        | B     | 20" x 20" x 28 $\frac{3}{16}$ "                                                 |
| P3                                           | 1        | B     | 39" x 3 $\frac{5}{8}$ " x 20" x 19 $\frac{5}{16}$ "                             |
| S1                                           | 4        | B     | 18 $\frac{7}{16}$ " x 3 $\frac{5}{8}$ " x 18 $\frac{3}{4}$ "                    |
| S2                                           | 1        | B     | 10 $\frac{1}{4}$ " x 2 $\frac{7}{16}$ " x 10 $\frac{3}{8}$ " x $\frac{1}{2}$ "  |
| S3                                           | 1        | B     | 3" x 1 $\frac{1}{16}$ " x 3 $\frac{1}{8}$ " x $\frac{1}{2}$ "                   |
| S4                                           | 1        | B     | 6 $\frac{1}{8}$ " x 2 $\frac{7}{16}$ "                                          |
| S5                                           | 1        | B     | 6 $\frac{1}{8}$ " x 1 $\frac{1}{16}$ "                                          |
| S6                                           | 1        | B     | 7 $\frac{3}{4}$ " x 1 $\frac{3}{4}$ "                                           |
| S7                                           | 1        | A     | 2 $\frac{9}{16}$ " x 6" x 3 $\frac{5}{8}$ " x 5 $\frac{7}{8}$ "                 |
| S8                                           | 1        | A     | 1 $\frac{5}{32}$ " x 7 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ " x 7 $\frac{3}{8}$ "  |
| S9                                           | 1        | C     | 6 $\frac{1}{16}$ " x 6 $\frac{3}{16}$ " x 1 $\frac{3}{32}$ "                    |
| S10                                          | 1        | A     | 1 $\frac{7}{8}$ " x 9 $\frac{7}{8}$ " x 3 $\frac{5}{8}$ " x 9 $\frac{11}{16}$ " |
| S11                                          | 1        | C     | 8 $\frac{1}{2}$ " x 8 $\frac{3}{4}$ " x 1 $\frac{13}{16}$ "                     |

- GENERAL NOTES:
- COVER PLATE PANELS ARE  $\frac{3}{16}$ " THICK.
- ALL STIFFENERS ARE  $\frac{1}{4}$ " THICK.
- CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE A36 STEEL AND GALVANIZED.
- FOR GALVANIZED REQUIREMENTS, SEE SEC 1040.
- ALL HOLE DIAMETERS SHALL BE 1".



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

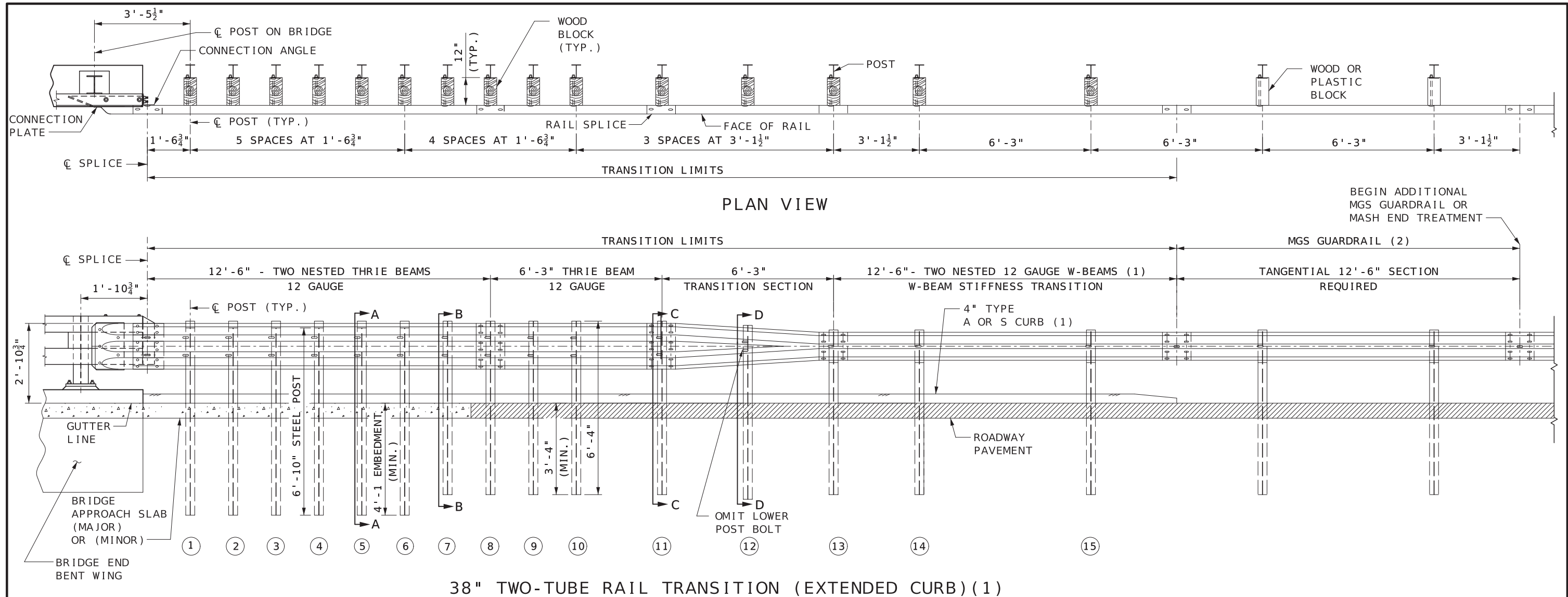


MIDWEST GUARDRAIL SYSTEM  
(MGS)  
VERTICAL BARRIER TRANSITIONS  
(SINGLE SLOPE BARRIER  
CONNECTOR PLATE DETAIL)

DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/21/2025

606.60C

SHEET NO.  
6 OF 6



38" TWO-TUBE RAIL TRANSITION (EXTENDED CURB) (1)

GENERAL NOTES:

MGS GUARDRAIL SHALL BE TANGENTIAL WITH BRIDGE APPROACH TRANSITION FOR 12'-6" BEYOND THE TWO NESTED W-BEAM STIFFNESS TRANSITION AND 25'-0" BEYOND THRIE BEAM TRANSITION SECTION.

AT THE CONTRACTORS OPTION, A SINGLE 18'-9" PIECE OF THRIE BEAM MAY BE SUBSTITUTED FOR ONE OF THE 12'-6" PANELS AND THE 6'-3" SECTION AS SHOWN.

FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SEC 1040 OF THE STANDARD SPECIFICATIONS.

RAIL POSTS SHALL BE SET PERPENDICULAR TO THE ROADWAY PROFILE GRADE AND VERTICALLY IN CROSS SECTION.

USE 5/8" BUTTON-HEAD OVAL SHOULDER BOLTS WITH HEX NUTS AT ALL SLOTS (THICKNESS OF HEX NUTS = 3/8" MIN.).

THE CONNECTION PLATE AND ANGLE SHALL BE FABRICATED FROM ASTM A709 GRADE 50 STEEL AND GALVANIZED.

ALL LAP SPLICES, INCLUDING END SHOES, SHALL BE MADE IN THE DIRECTION OF TRAFFIC.

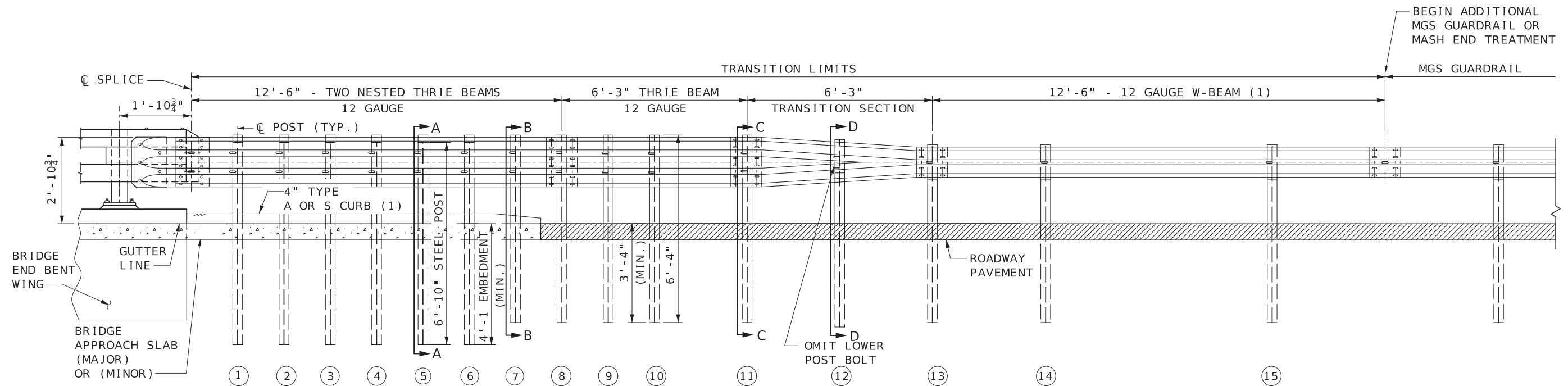
THE COST OF FURNISHING, FABRICATING AND INSTALLING BRIDGE APPROACH TRANSITION (EXTENDED CURB), COMPLETE IN PLACE, WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

THE CONTRACTOR MAY, AT THEIR OPTION, FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A769 GRADE 36 OR 40. THE SECTIONS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH REQUIREMENTS OF AASHTO M 111.

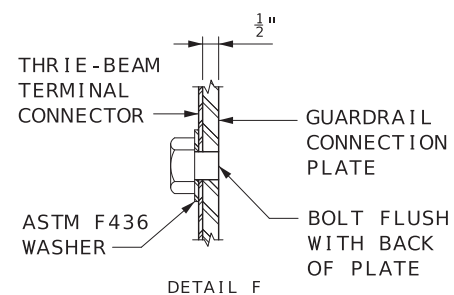
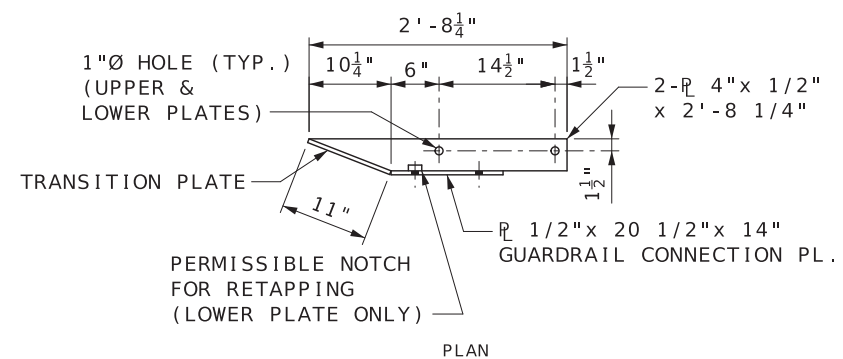
(1) WHERE CURB EXTENDS UPSTREAM OF POST NO. (11) FOR DRAINAGE PURPOSES, A STIFFNESS TRANSITION CONSISTING OF AN EXTRA 12'-6" BEAM OF 12 GAUGE W-BEAM MUST BE NESTED PRIOR TO THE TRANSITION SECTION (UPSTREAM OF POST NO. (13)). THE CURB SHALL BE EXTENDED TO THE END OF THE 12'-6" 12 GAUGE W-BEAM STIFFNESS TRANSITION SEE STD. PLAN 609.40 FOR DETAILS. WHEN CURBS DO NOT EXTEND UPSTREAM OF POST NO. (11), PAY FOR A TWO-TUBE RAIL TRANSITION (REGULAR CURB/NO CURB). FOR DETAILS OF TWO-TUBE RAIL TRANSITION (REGULAR CURB/NO CURB), SEE SHEET 2 OF 3.

(2) THE ADDITIONAL REQUIRED MGS GUARDRAIL IS INCLUDED IN THE TOTAL LENGTH OF NEED AND SHALL BE PAID FOR AS A GUARDRAIL PAY ITEM.

|                                                                                                                                                                                                                                  |                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                   |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>38-INCH TWO-TUBE RAIL TRANSITIONS</b> |
| DATE EFFECTIVE: 4/1/2024<br>DATE PREPARED: 1/9/2024                                                                                                                                                                              | 606.61                                                                            |
| SHEET NO. 1 OF 3                                                                                                                                                                                                                 |                                                                                   |



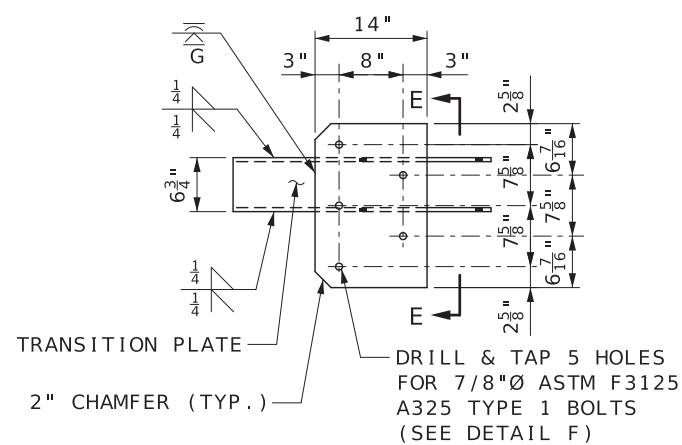
38" TWO-TUBE RAIL TRANSITION (WITH REGULAR LENGTH CURB OR NO CURB) (1)



GENERAL NOTES:  
SEE SHEET 1 FOR ADDITIONAL NOTES NOT INCLUDED ON THIS SHEET.

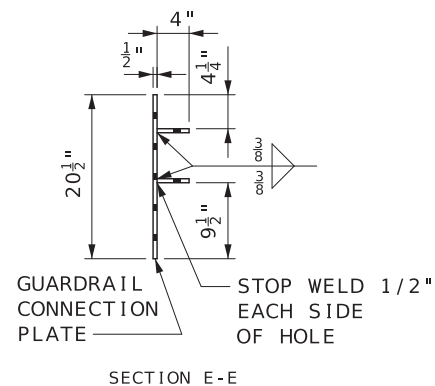
THE COST OF FURNISHING, FABRICATING AND INSTALLING BRIDGE APPROACH TRANSITION (REGULAR/NO CURB), COMPLETE IN PLACE, WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

- (1) WHERE CURB EXTENDS UPSTREAM OF POST NO. (11) FOR DRAINAGE PURPOSES, A STIFFNESS TRANSITION CONSISTING OF AN EXTRA 12'-6" BEAM OF 12 GAUGE W-BEAM MUST BE NESTED PRIOR TO THE TRANSITION SECTION (UPSTREAM OF POST NO. (13)). THE CURB SHALL BE EXTENDED TO THE END OF THE 12'-6" 12 GAUGE W-BEAM STIFFNESS TRANSITION SEE STD. PLAN 609.40 FOR DETAILS. IF CURB EXTENDS BEYOND POST NO. (11), PAY FOR A TWO-TUBE RAIL TRANSITION (EXTENDED CURB). FOR DETAILS OF TWO-TUBE RAIL TRANSITION (EXTENDED CURB), SEE SHEET 1 OF 3.

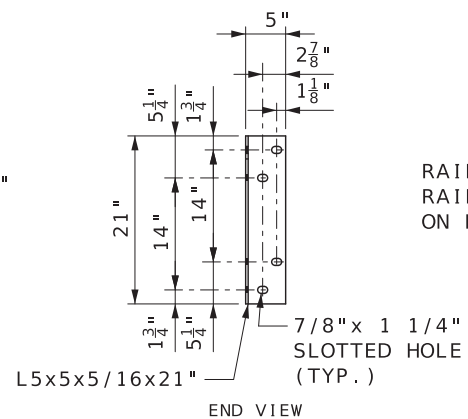


ELEVATION

GUARDRAIL CONNECTION PLATE

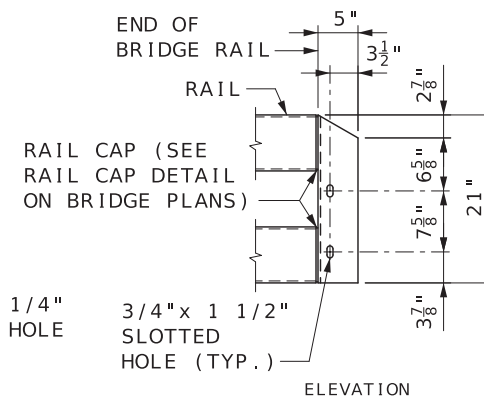


SECTION E-E



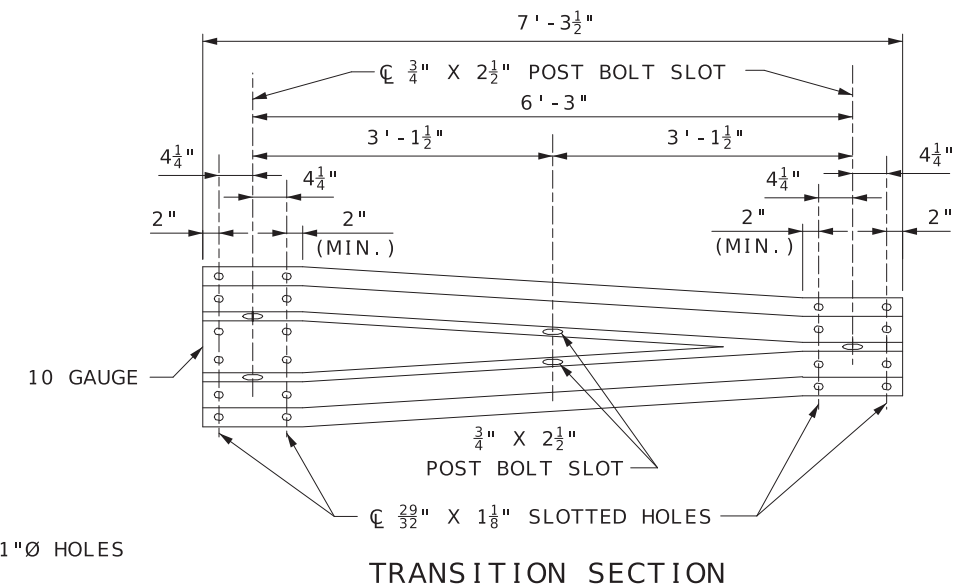
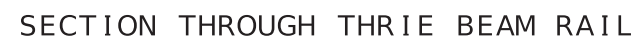
END VIEW

CONNECTION ANGLE



ELEVATION

|                                                                                                                                                                                                                                  |                                                                                   |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                   |        |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>38-INCH TWO-TUBE RAIL TRANSITIONS</b> |        |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 4/1/2024<br>DATE PREPARED: 1/9/2024                               | 606.61 |



|                                                                                       |                                                                                  |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b>                       |
|                                                                                       | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |

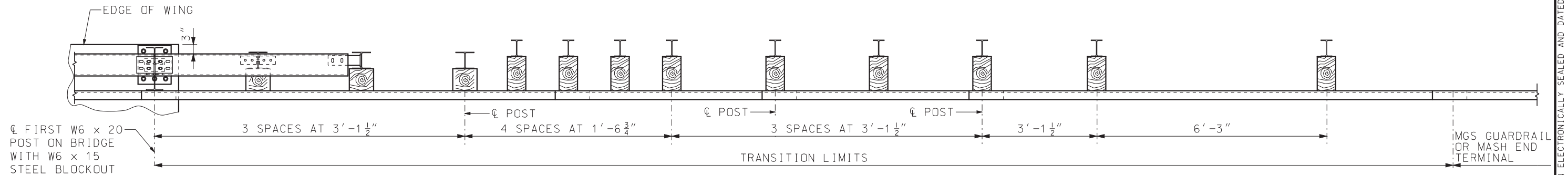
  

|                                                                                       |                                                                                                                                    |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|  | <h2 style="margin: 0;">MIDWEST GUARDRAIL SYSTEM<br/>(MGS)</h2> <h3 style="margin: 0;">38 - INCH TWO-TUBE RAIL<br/>TRANSITIONS</h3> |
| <small>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</small>   |                                                                                                                                    |

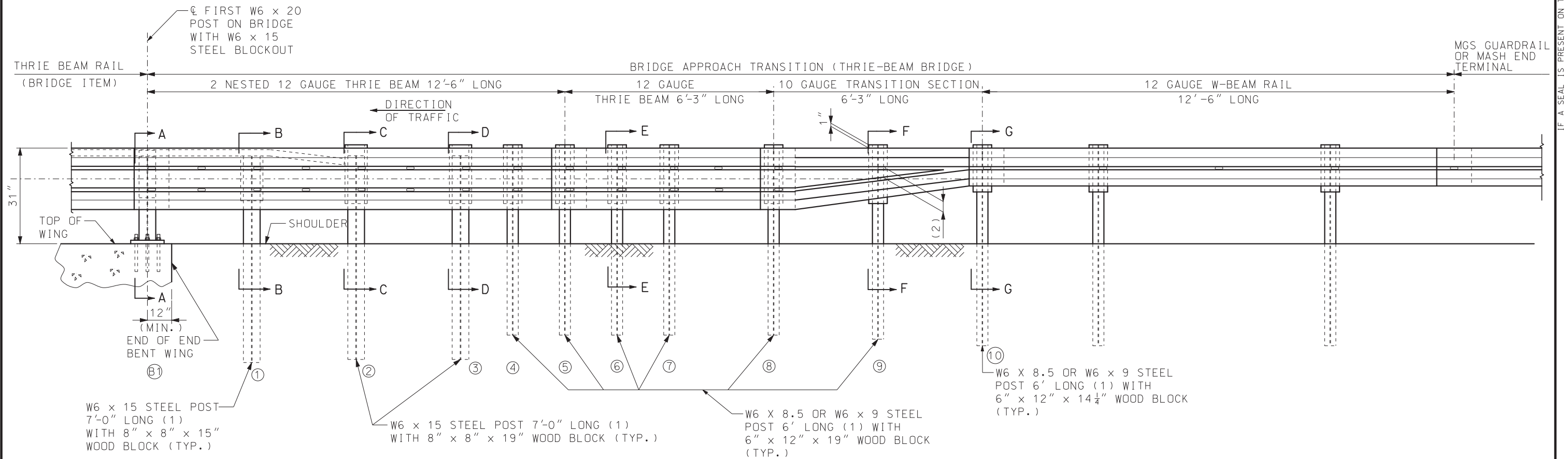
  

|                 |          |                                                          |
|-----------------|----------|----------------------------------------------------------|
| DATE EFFECTIVE: | 4/1/2024 |                                                          |
| DATE PREPARED:  | 1/9/2024 |                                                          |
|                 | 606.61   |                                                          |
|                 |          | SHEET NO.<br><span style="font-size: 2em;">3 OF 3</span> |





PLAN



PART SECTION THROUGH SLAB AT END OF WING

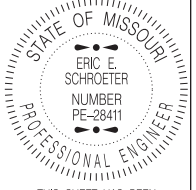
NOTES:

FOR GENERAL NOTES, SEE SHEET 2 OF 5.

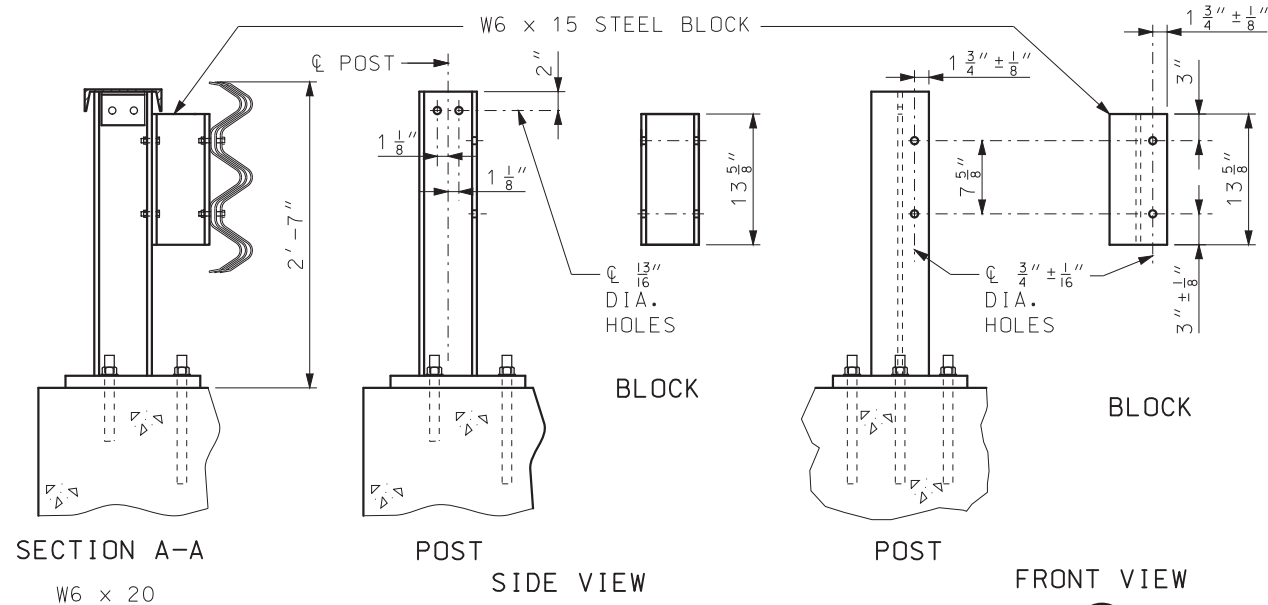
FOR POST DETAILS AND SECTION VIEWS, SEE SHEET 2 AND 3 OF 5.

(1) AT CONTRACTOR'S OPTION, EQUIVALENT SECTIONS MAY BE FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A769 GRADE 36 OR 40. THE SECTIONS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO 111.

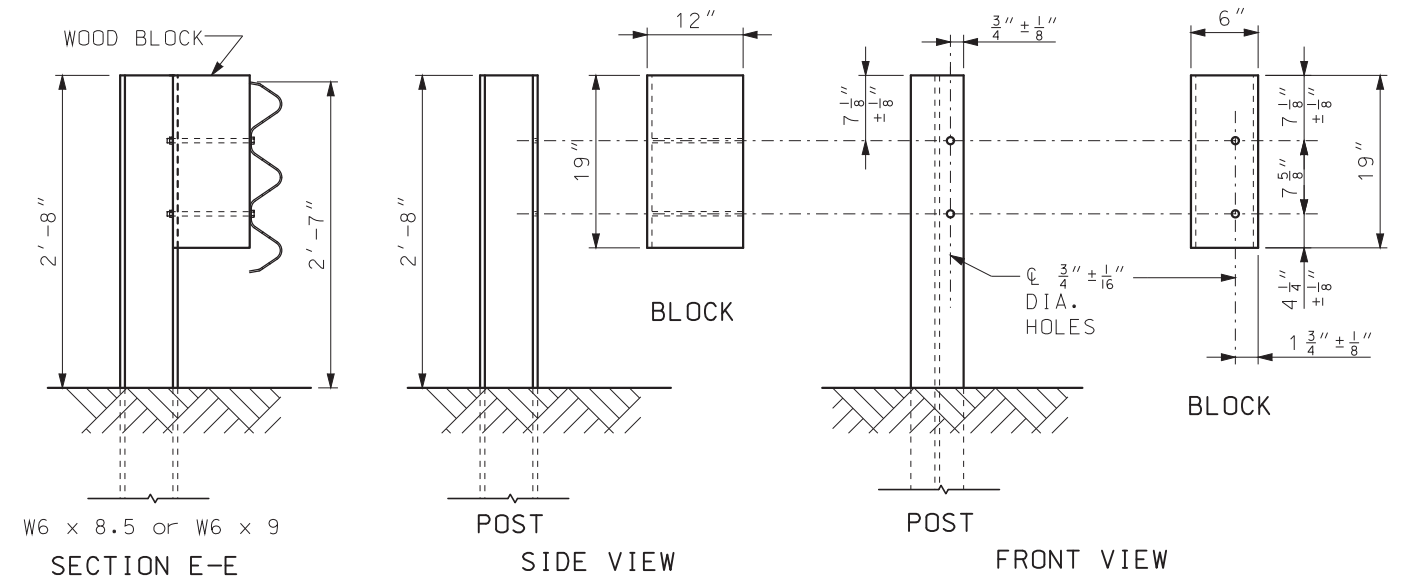
(2) VERIFY BY RAIL TRANSITION PRODUCER.

|                                                                                                                                                                                                                                  |                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                             |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>BRIDGE APPROACH TRANSITION</b><br><b>(THRIE BEAM ON BRIDGE)</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | 606.70B                                                                                                     |
| SHEET NO.<br>1 OF 5                                                                                                                                                                                                              |                                                                                                             |

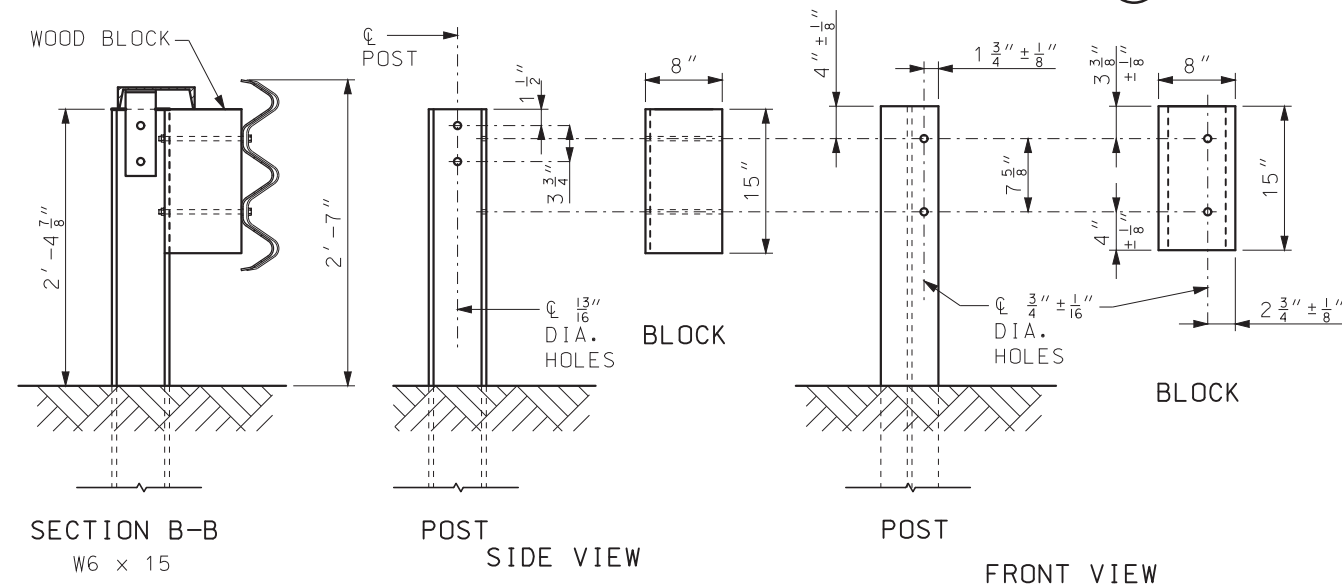
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



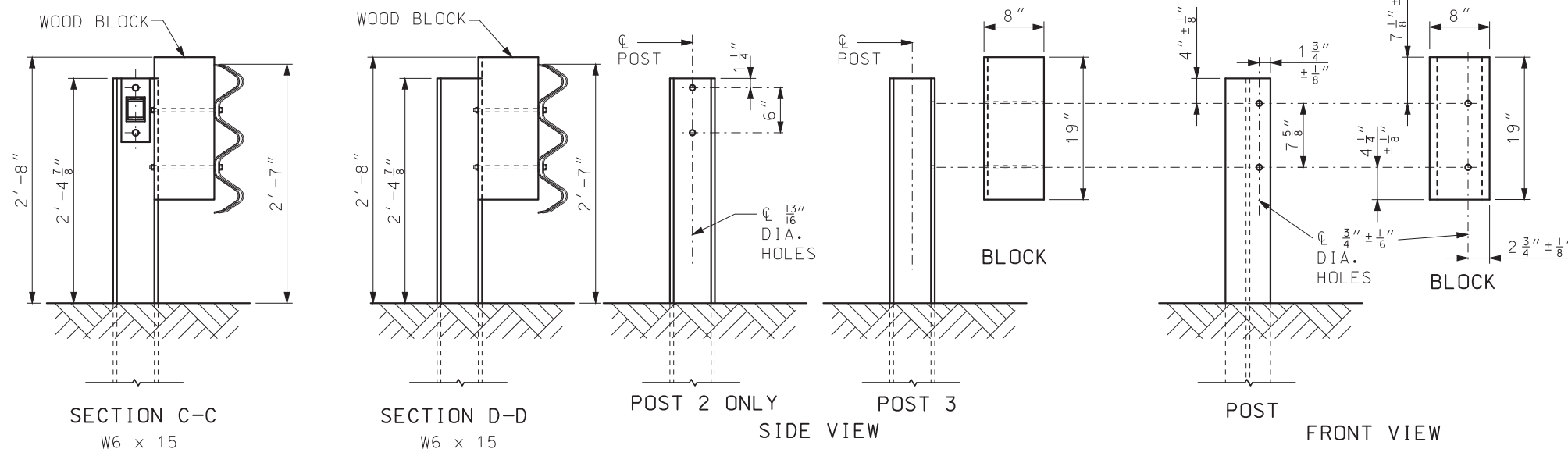
STEEL POST AND STEEL BLOCK (B1)



STEEL POST AND WOOD BLOCK (4) THROUGH (8)



STEEL POST AND WOOD BLOCK (1)



STEEL POST AND WOOD BLOCK (2) and (3)

GENERAL NOTES:

DESIGN BASED UPON MASH TEST LEVEL 3 (TL-3).

FABRICATED STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.

FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SEC 1040 OF THE STANDARD SPECIFICATIONS.

RAIL POSTS SHALL BE SET PERPENDICULAR TO THE ROADWAY PROFILE GRADE AND VERTICALLY IN CROSS SECTION.

USE 5/8" BUTTON-HEAD, OVAL SHOULDER BOLTS WITH HEX NUTS (THICKNESS OF HEX NUTS = 3/8" MIN.) AT ALL SLOTS.

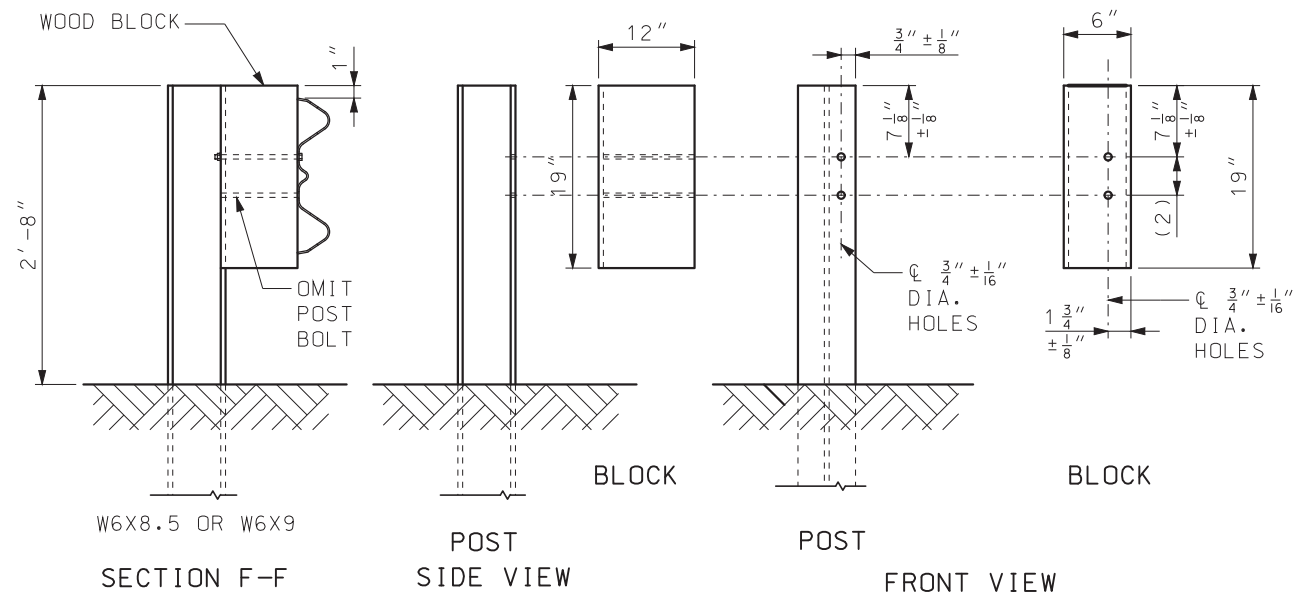
ALL LAP SPLICES SHALL BE MADE IN THE DIRECTION OF TRAFFIC.

THE COST OF FURNISHING, FABRICATING AND INSTALLING TRANSITION SECTION, COMPLETE-IN-PLACE, SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

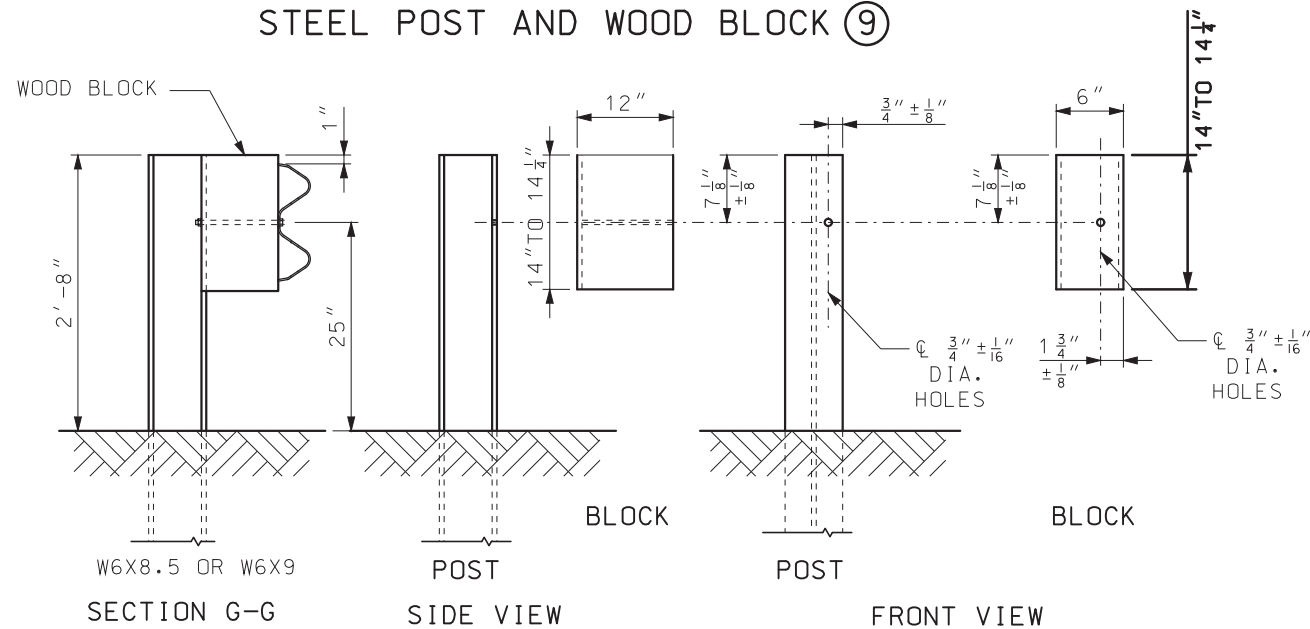
THE COST OF FURNISHING, FABRICATING AND INSTALLING BRIDGE ANCHOR SECTION (THRIE BEAM), COMPLETE-IN-PLACE, SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH.

FOR DETAILS NOT SHOWN, SEE BRIDGE THRIE BEAM RAIL SHEET.

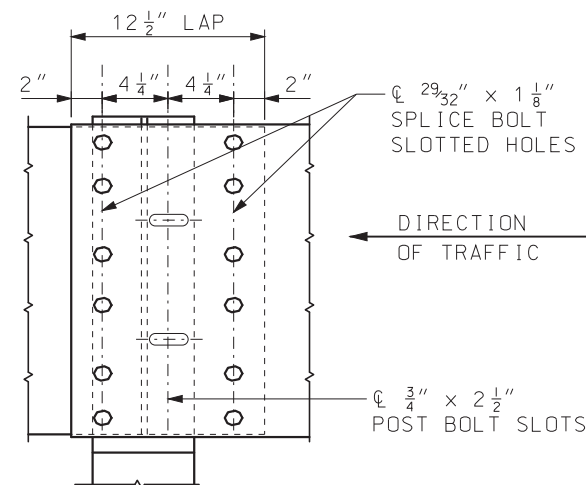
|                                                                                                                                                                                                                                  |                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                             |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>BRIDGE APPROACH TRANSITION</b><br><b>(THRIE BEAM ON BRIDGE)</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | 606.70B<br>SHEET NO. 2 OF 5                                                                                 |



STEEL POST AND WOOD BLOCK (9)

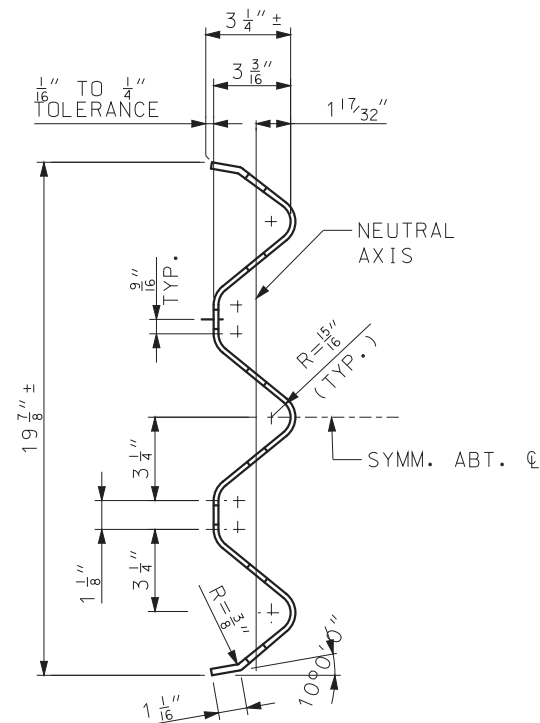


STEEL POST AND WOOD BLOCK (10)

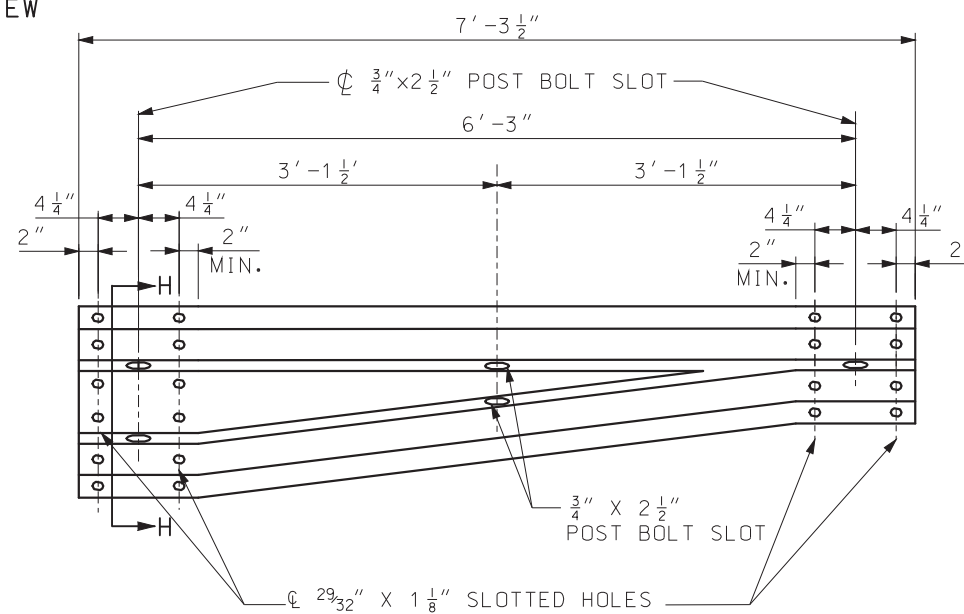


THRIE BEAM RAIL SPLICE AT POST

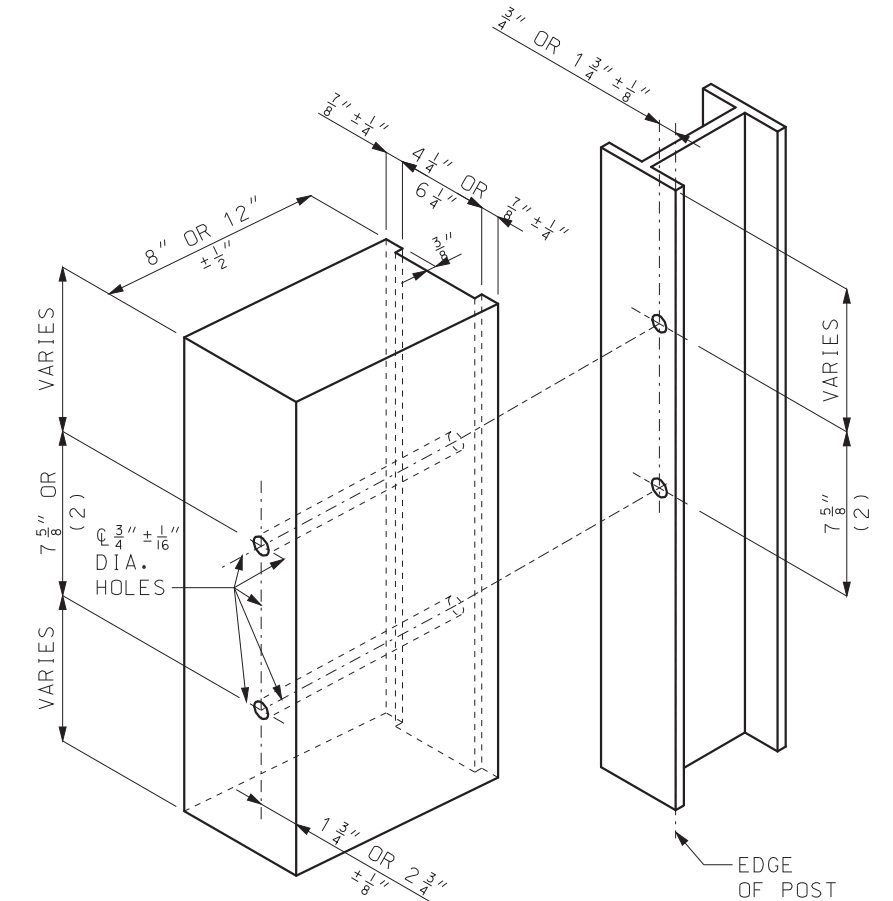
(2) VERIFY BY RAIL TRANSITION PRODUCER.



THROUGH THRIE BEAM RAIL

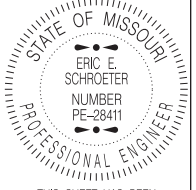


ASYMMETRICAL TRANSITION SECTION

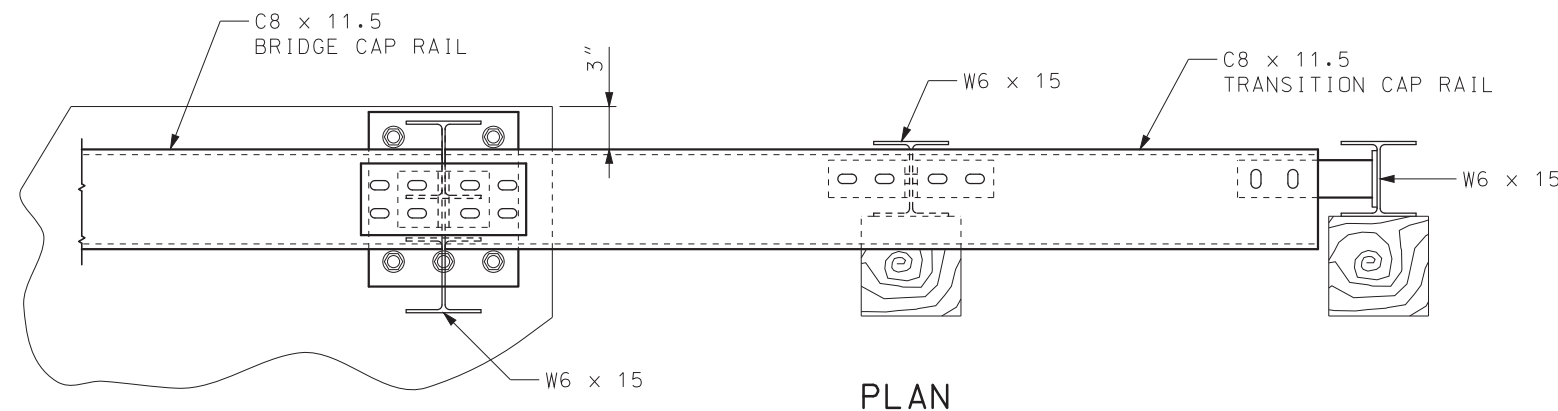


POST (9) - (2) VERIFY BY RAIL TRANSITION PRODUCER (SEE FRONT SHEET)  
 POST (10) - ONLY 1 HOLE REQUIRED  
 ALL HOLES 3/4" ± 1/16" DIAMETER EXCEPT AS NOTED

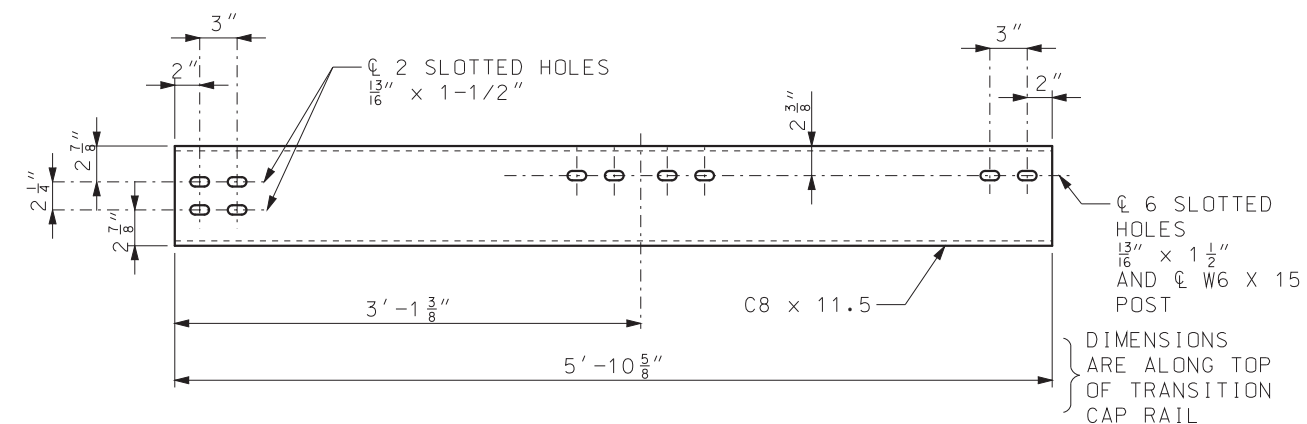
HOLE PUNCHING DETAIL  
 FOR STEEL POST & WOOD BLOCKS (6" AND 8")

|                                                                                                                                                                                                                                  |                                                                                                             |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                             |         |
|  THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.                                                                               | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>BRIDGE APPROACH TRANSITION</b><br><b>(THRIE BEAM ON BRIDGE)</b> |         |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 04/01/2018<br>DATE PREPARED: 2/9/2018                                                       | 606.70B |

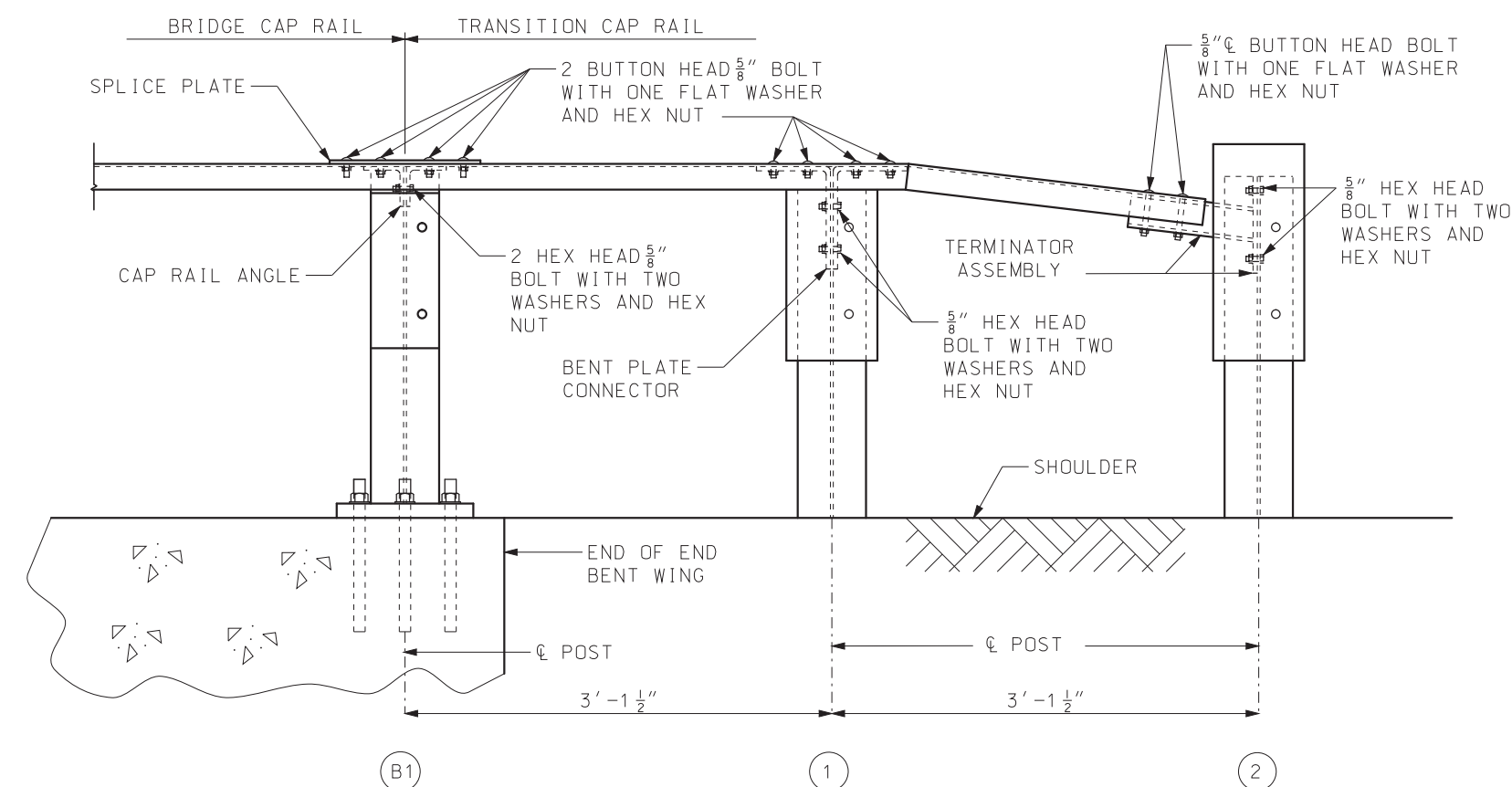




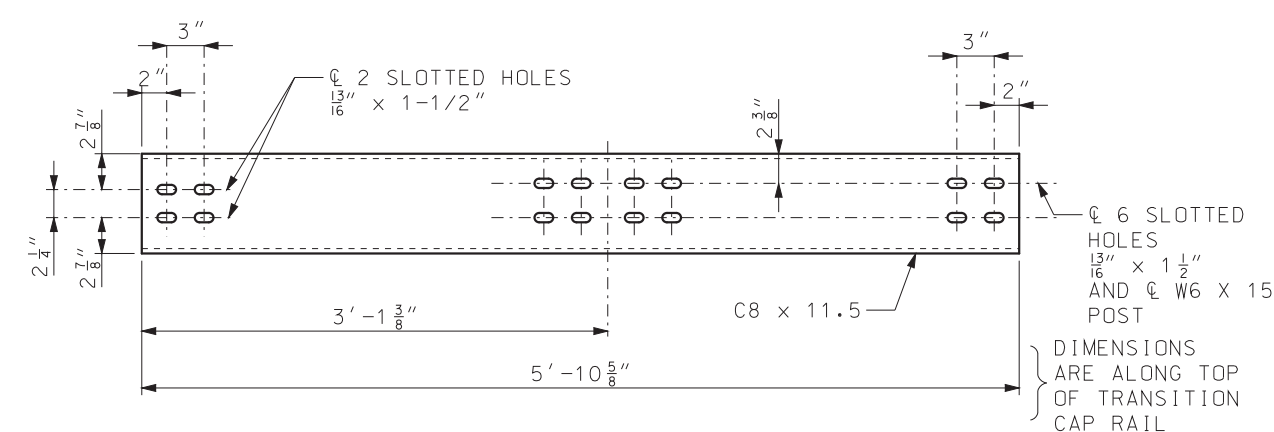
PLAN



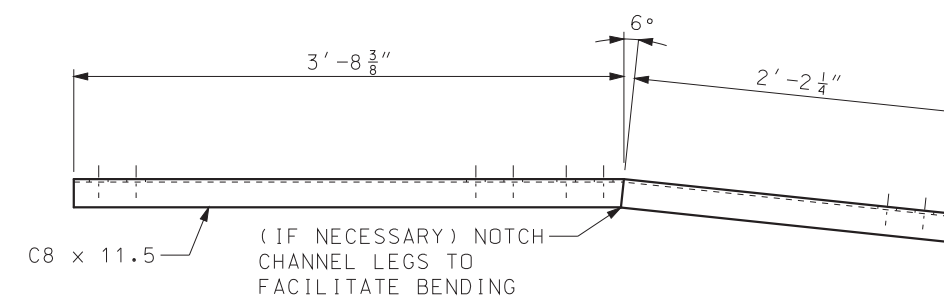
TOP VIEW (ALTERNATE 1)



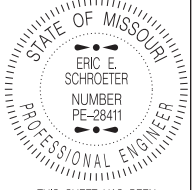
ELEVATION  
(THRIE BEAM RAIL NOT SHOWN)



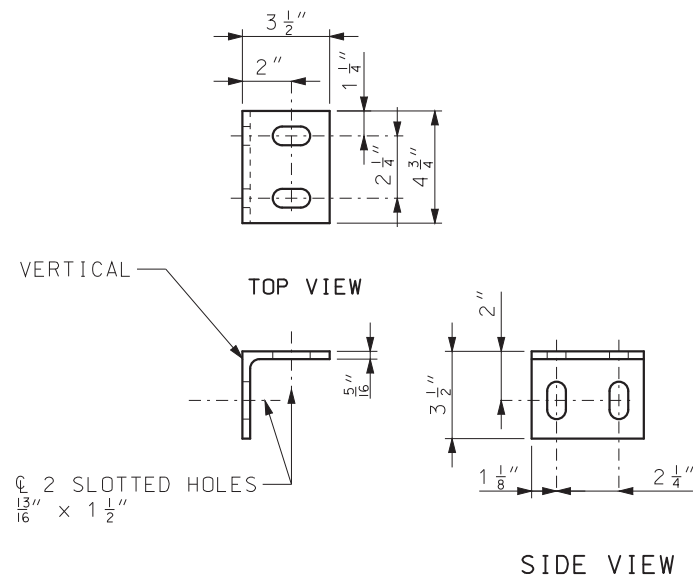
TOP VIEW (ALTERNATE 2)



ELEVATION  
TRANSITION CAP RAIL

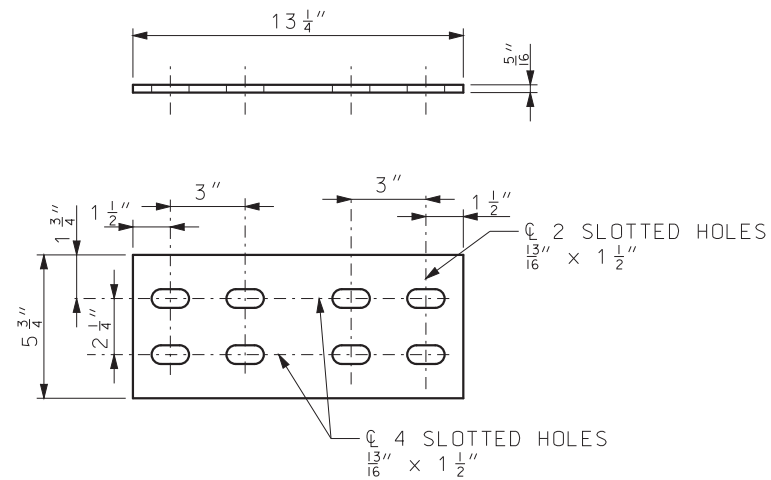
|                                                                                                                                                                                                                                  |                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                             |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>BRIDGE APPROACH TRANSITION</b><br><b>(THRIE BEAM ON BRIDGE)</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | 606.70B                                                                                                     |
| SHEET NO.<br>4 OF 5                                                                                                                                                                                                              |                                                                                                             |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

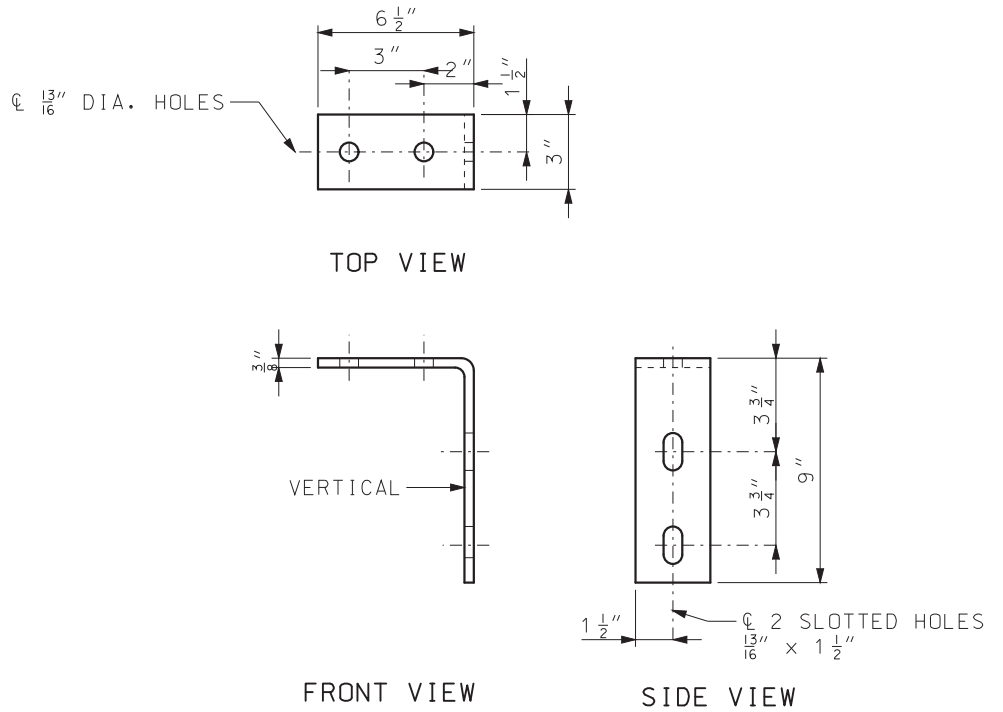


CAP RAIL ANGLE

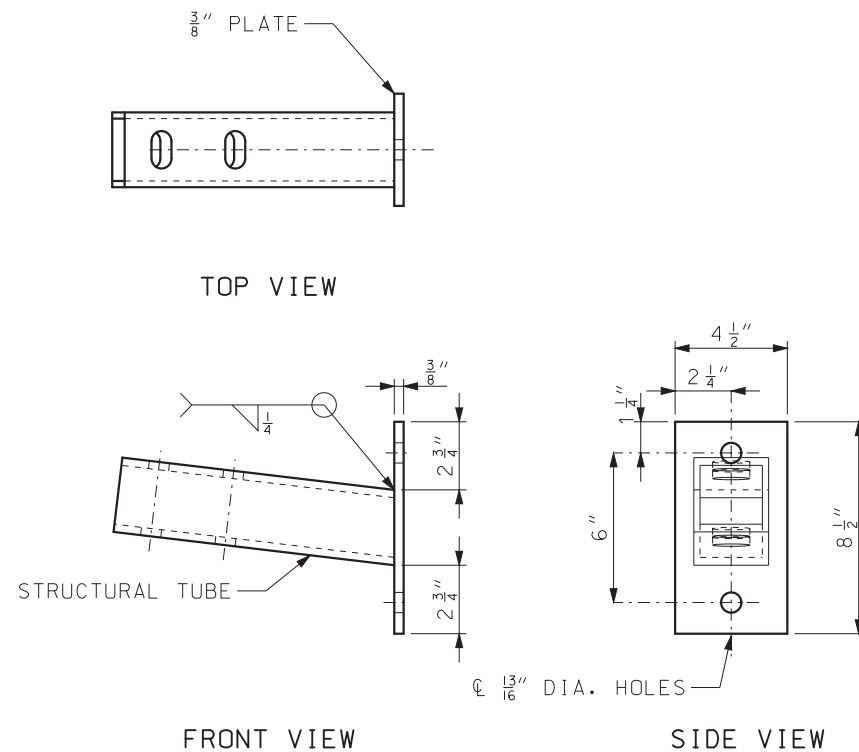
∠ 3 1/2" x 3 1/2" x 5/16"



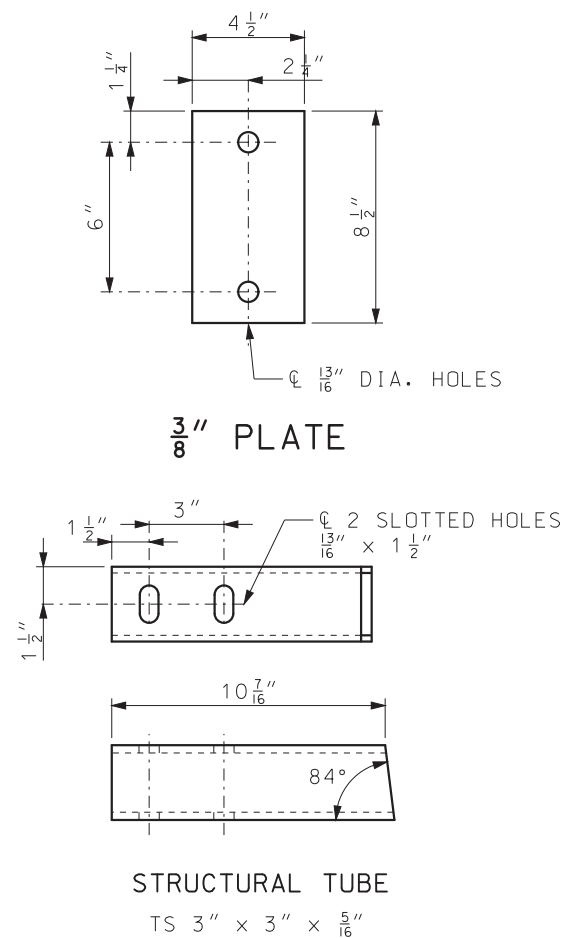
SPLICE PLATE



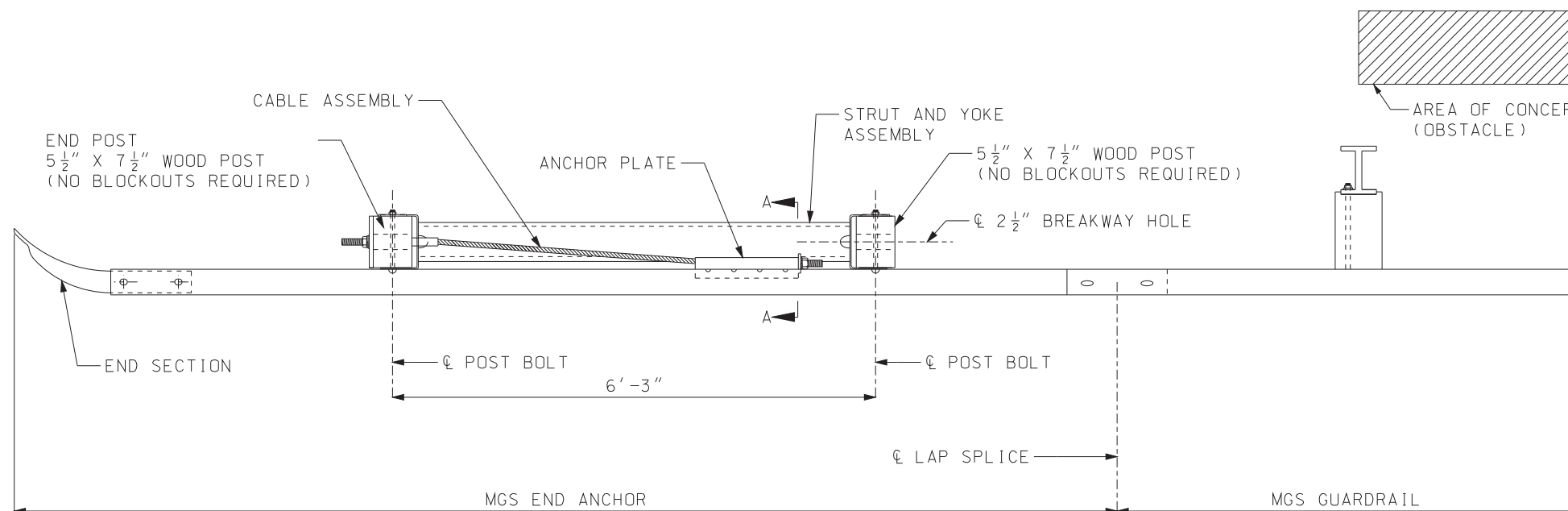
BENT PLATE  
CONNECTOR



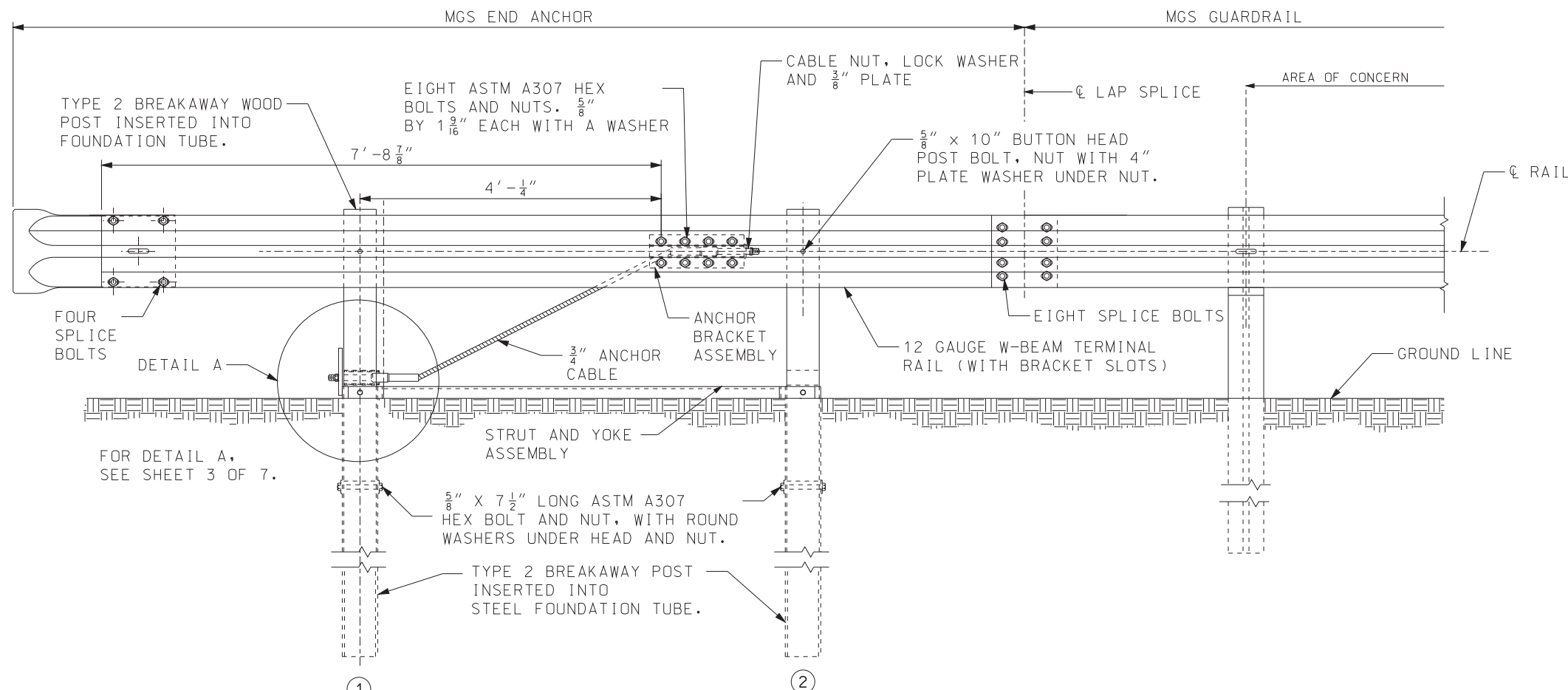
TERMINATOR ASSEMBLY



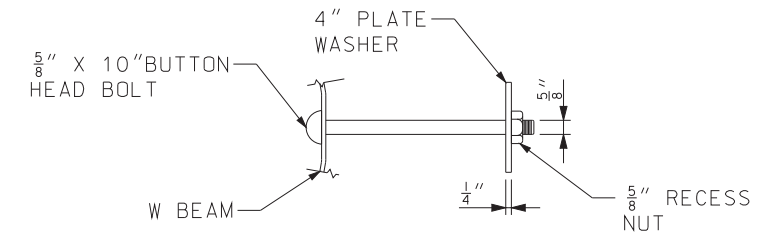
|                                                                                                                                                                                                                                  |                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                             |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>BRIDGE APPROACH TRANSITION</b><br><b>(THRIE BEAM ON BRIDGE)</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | 606.70B                                                                                                     |
| SHEET NO. 5 OF 5                                                                                                                                                                                                                 |                                                                                                             |



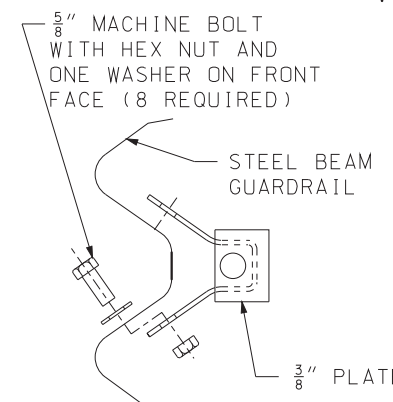
PLAN VIEW



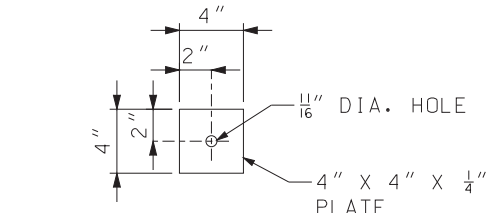
ELEVATION VIEW



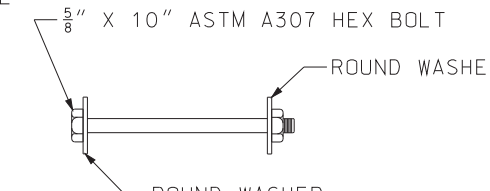
POST BOLT AT W-BEAM



SECTION A-A



4" PLATE WASHER



POST BOLT AT YOKE

GENERAL NOTES:

END ANCHOR DETAILS SHOWN SHALL BE USED ONLY ON DOWNSTREAM ENDS OF GUARDRAIL WHEN AN END ANCHOR IS REQUIRED.

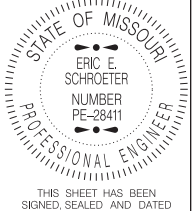
THE DETAILS SHOWN ARE FOR AN END ANCHORAGE SYSTEM FOR GUARDRAIL.

CABLE ASSEMBLY AND ANCHOR PLATE SHALL HAVE A MINIMUM BREAKING STRENGTH OF 20 TONS.

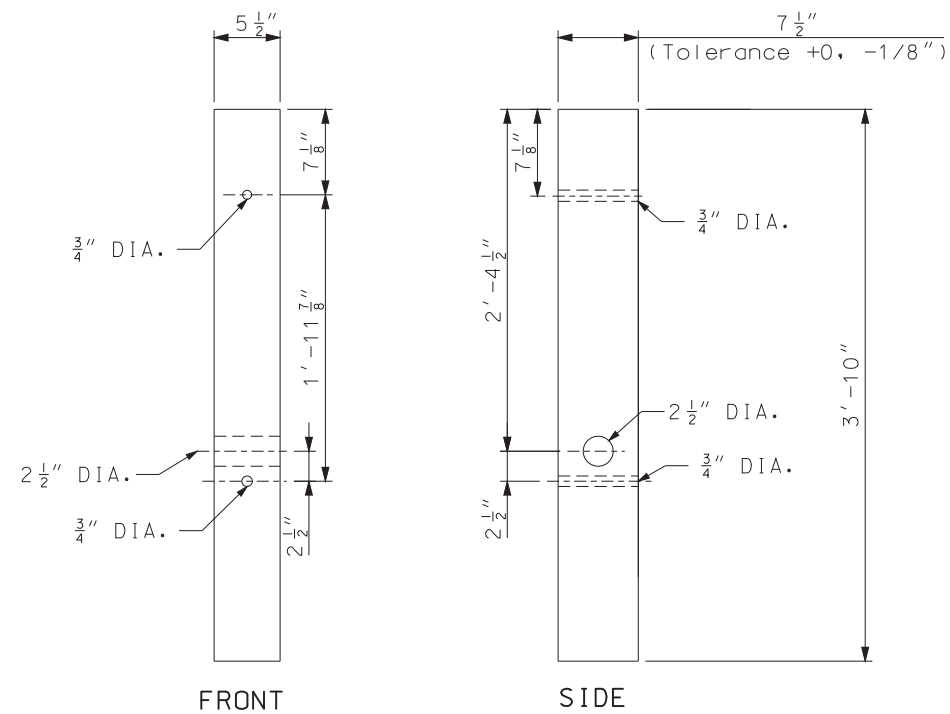
ALL FITTINGS AND HARDWARE REQUIRED SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1040.

WOOD POSTS ① AND ② SHALL BE 5 1/2" X 7 1/2".

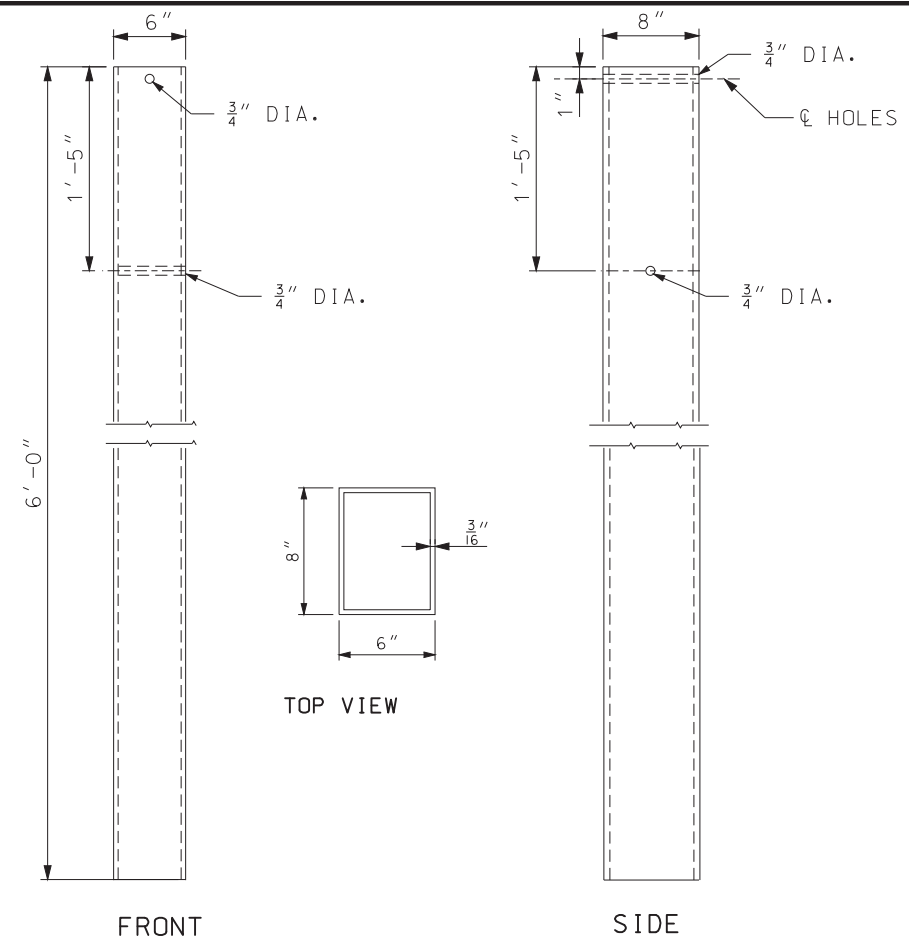
SEE SHEET NO. 2 OF 7 FOR WOOD POST DETAILS.

|                                                                                                                                                                                                                                  |                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                      |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>TERMINAL ANCHOR ENDS</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | 606.80C                                                              |
| SHEET NO. 1 OF 7                                                                                                                                                                                                                 |                                                                      |

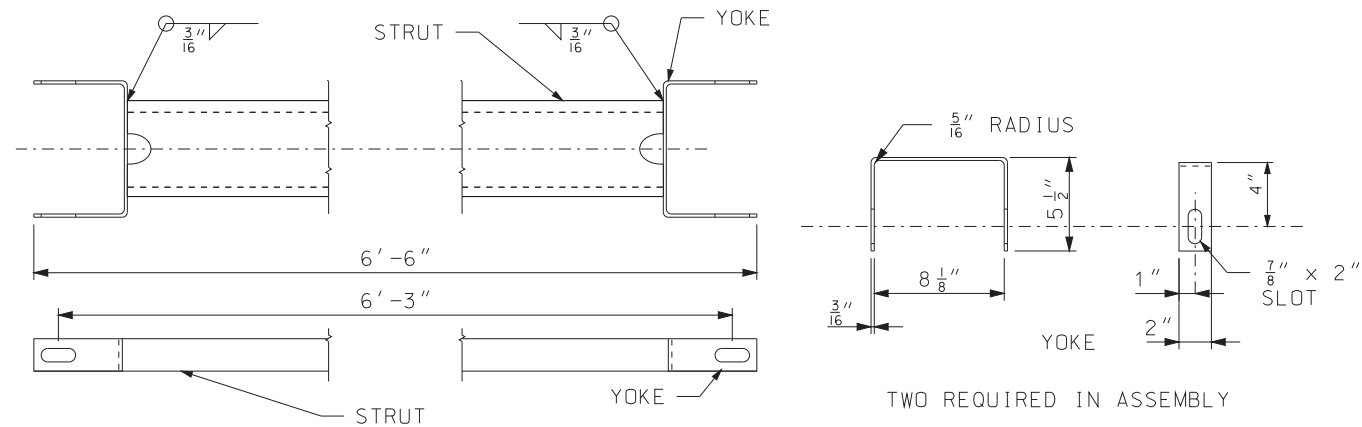
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



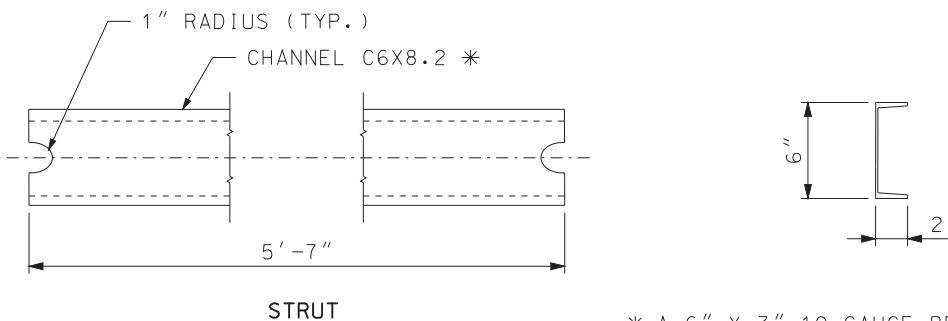
TYPE 2 BREAKAWAY  
WOOD POST



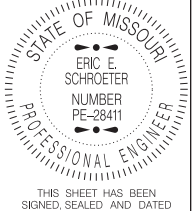
STEEL GROUND  
FOUNDATION TUBE



STRUT AND YOKE ASSEMBLY



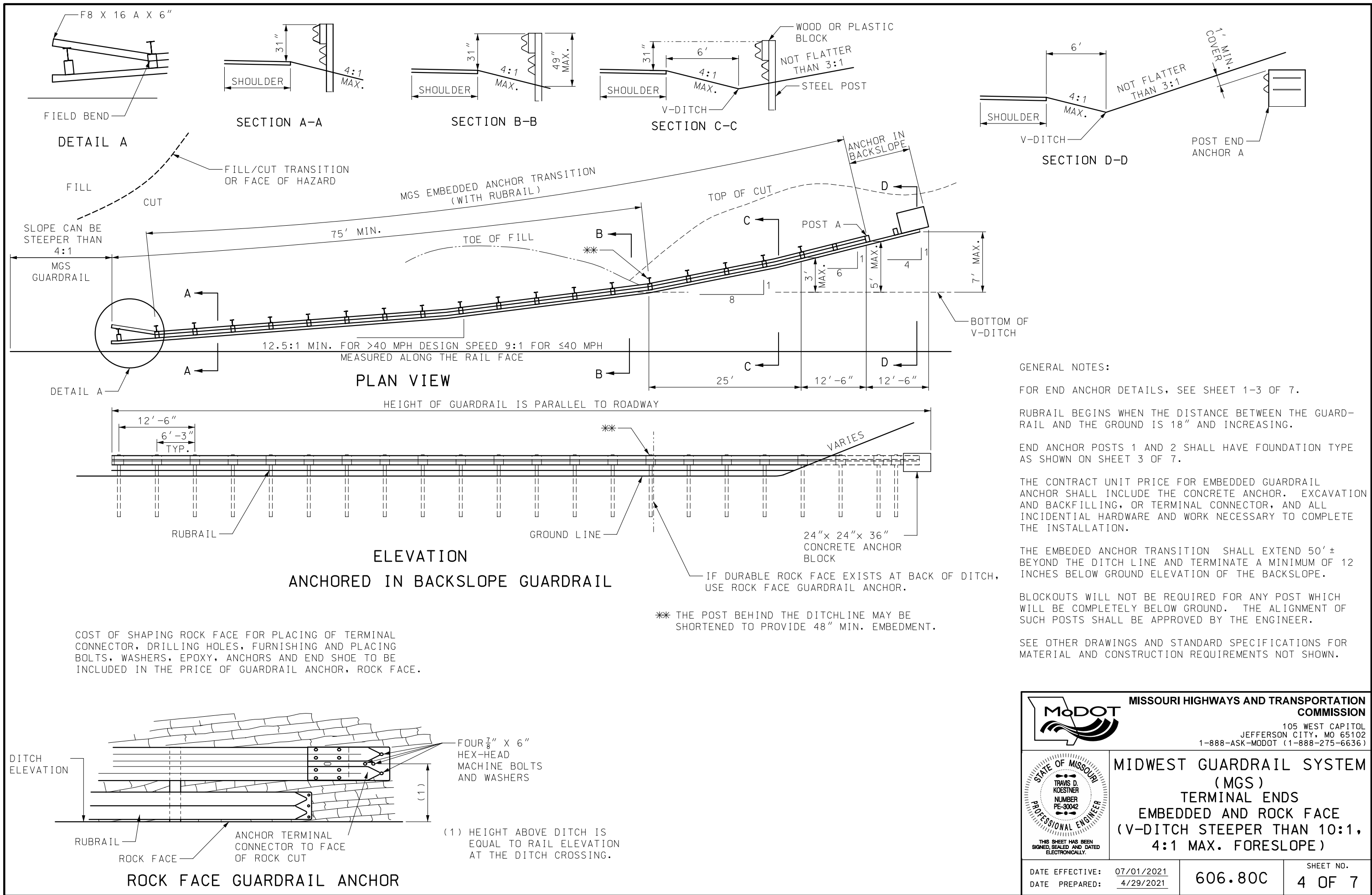
\* A 6" X 3" 10 GAUGE BENT PLATE STRUT  
MAY BE SUBSTITUTED FOR THE C-CHANNEL

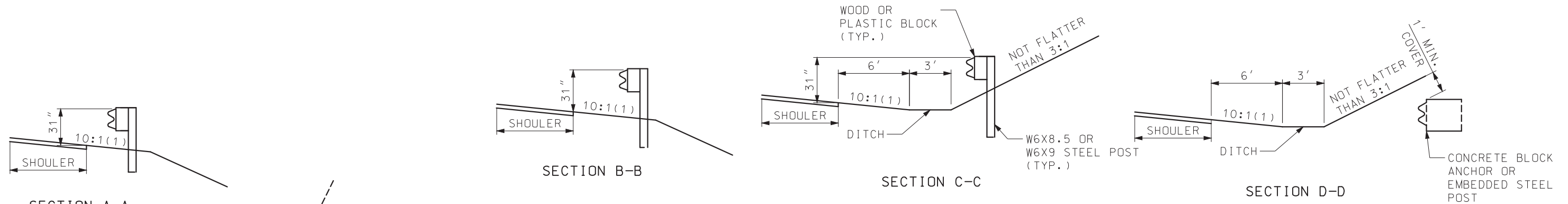
|                                                                                                                                                                                                                                                                |                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                               |                                                                    |
|  <p>STATE OF MISSOURI<br/>ERIC E. SCHROETER<br/>NUMBER PE-28411<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <b>MIDWEST GUARDRAIL SYSTEM<br/>(MGS)<br/>TERMINAL ANCHOR ENDS</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                                                          | 606.80C                                                            |
| SHEET NO.<br>2 OF 7                                                                                                                                                                                                                                            |                                                                    |



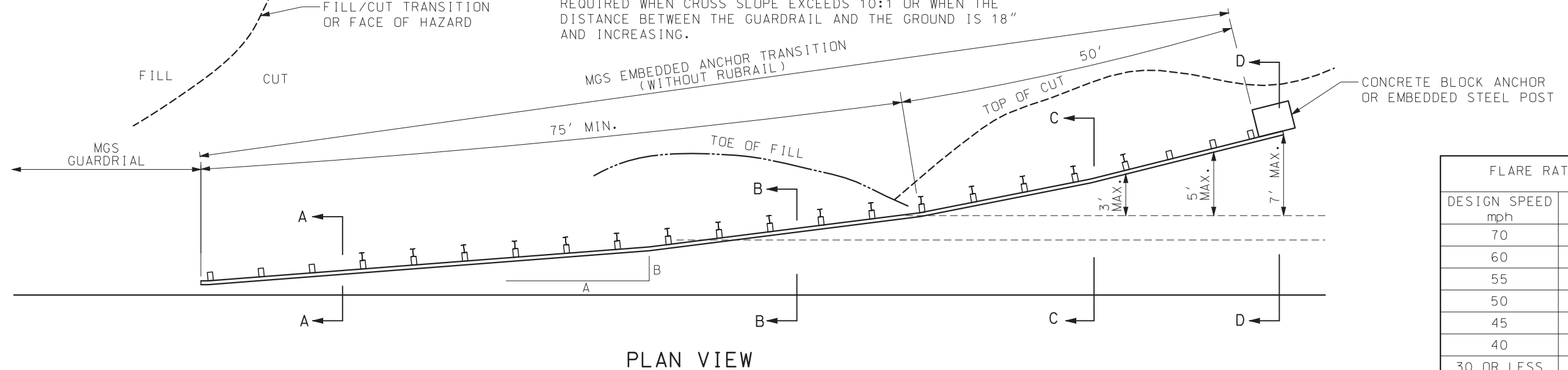
FOR LOCATION OF DETAIL A, SEE SHEET 1 OF 7.



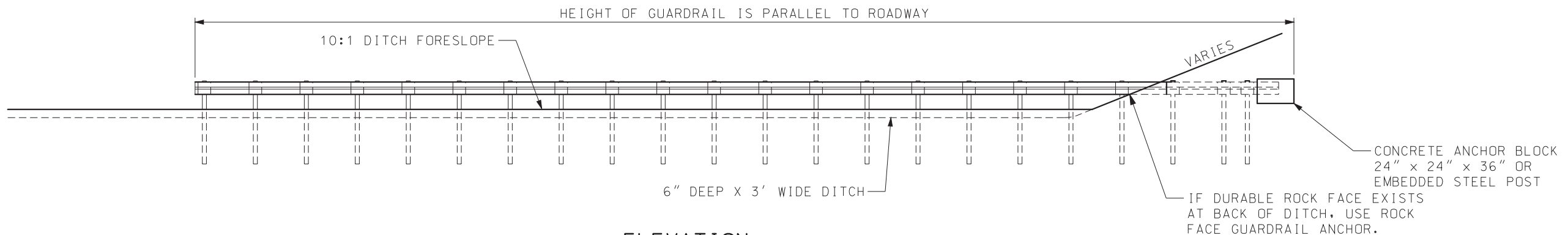




(1) MAX. CROSS SLOPE SHALL NOT EXCEED 4:1. RUBRAIL IS REQUIRED WHEN CROSS SLOPE EXCEEDS 10:1 OR WHEN THE DISTANCE BETWEEN THE GUARDRAIL AND THE GROUND IS 18" AND INCREASING.



| FLARE RATE          |      |
|---------------------|------|
| DESIGN SPEED<br>mph | A:B  |
| 70                  | 15:1 |
| 60                  | 13:1 |
| 55                  | 12:1 |
| 50                  | 11:1 |
| 45                  | 10:1 |
| 40                  | 9:1  |
| 30 OR LESS          | 7:1  |





**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**MIDWEST GUARDRAIL SYSTEM (MGS)**

**EMBEDDED ANCHOR TRANSITION**

**EMBEDDED TERMINAL ENDS (FLAT DITCH)**

STATE OF MISSOURI

ERIC E. SCHROETER

NUMBER PE-28411

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE EFFECTIVE: 07/01/2017

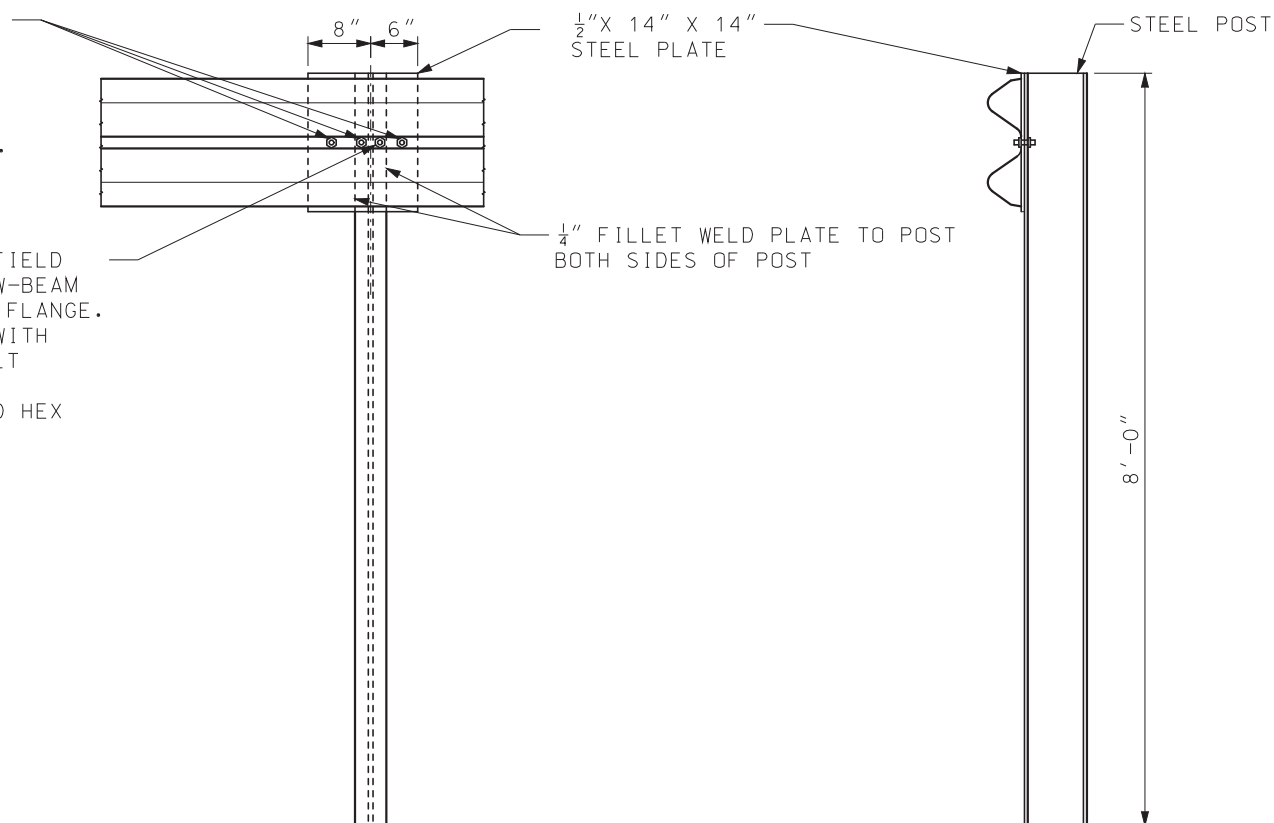
DATE PREPARED: 5/1/2017

606.80C

SHEET NO. 5 OF 7

3 - 1" Ø HOLES TO BE FIELD DRILLED IN W-BEAM ELEMENT AND ATTACHED WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLTS  $1\frac{7}{16}$ " LONG EACH WITH ONE SQUARE WASHER AND HEX NUT.

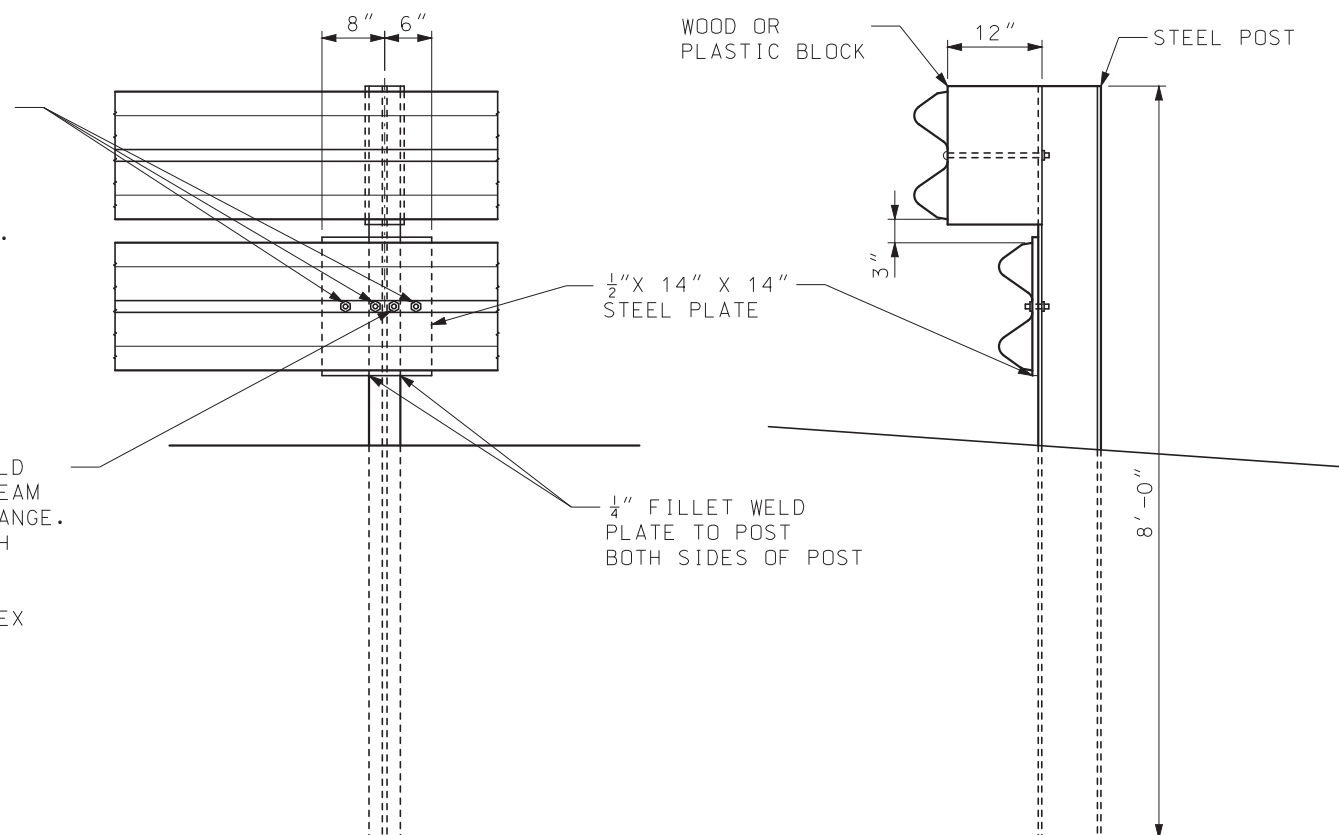
1" Ø HOLE TO BE FIELD DRILLED THROUGH W-BEAM AND THROUGH POST FLANGE. ATTACHED W-BEAM WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLT 2" LONG WITH ONE SQUARE WASHER AND HEX NUT.



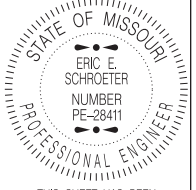
EMBEDDED STEEL POST

3 - 1" Ø HOLES TO BE FIELD DRILLED IN W-BEAM ELEMENT AND ATTACHED WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLTS  $1\frac{7}{16}$ " LONG EACH WITH ONE SQUARE WASHER AND HEX NUT.

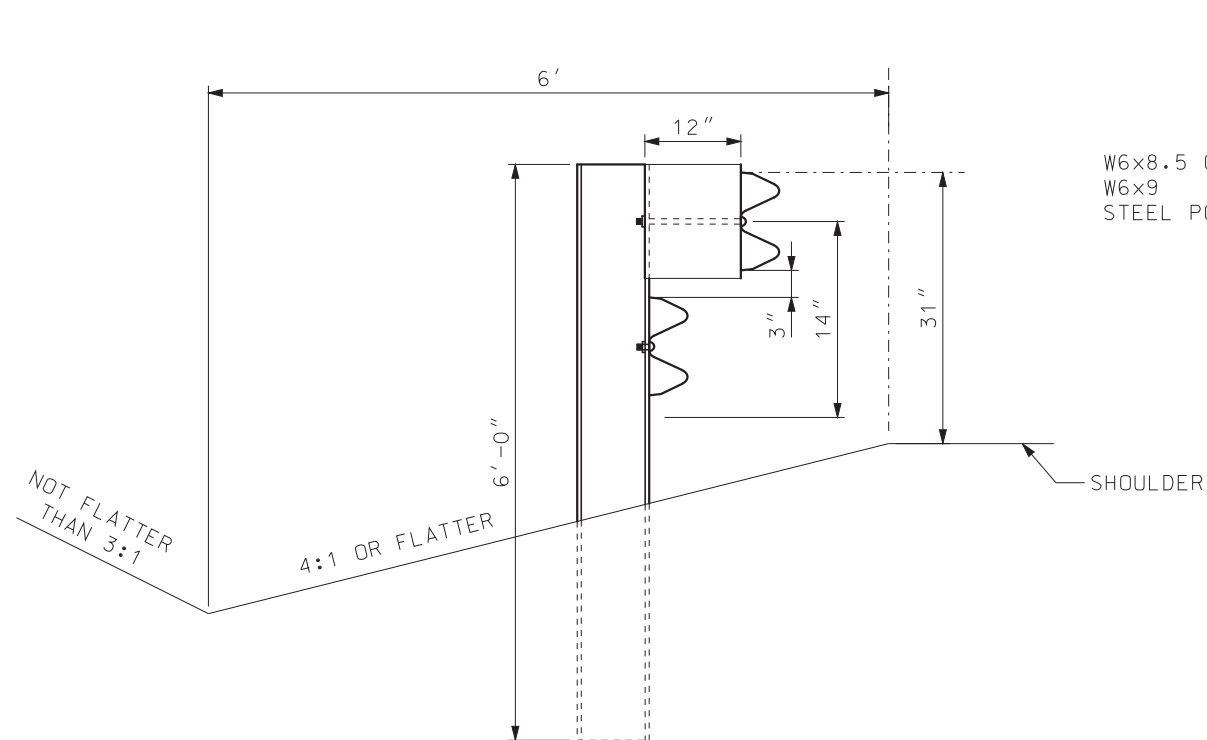
1" Ø HOLE TO BE FIELD DRILLED THROUGH W-BEAM AND THROUGH POST FLANGE. ATTACHED W-BEAM WITH  $\frac{7}{8}$ " Ø HEX HEAD BOLT 2" LONG WITH ONE SQUARE WASHER AND HEX NUT.



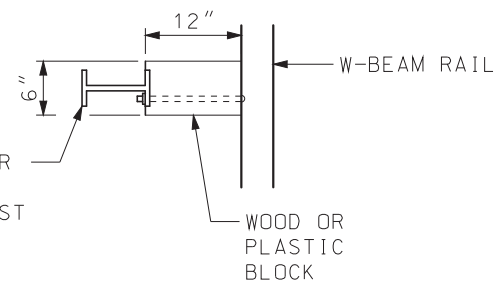
SPECIAL RUBRAIL TO POST CONNECTION AT POST A

|                                                                                       |                                                          |                                                                                  |                     |
|---------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------|---------------------|
|  |                                                          | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |                     |
|                                                                                       |                                                          | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                     |
|  | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b>                    |                                                                                  |                     |
|                                                                                       | <b>EMBEDDED ANCHOR TERMINAL ENDS (STEEL POST OPTION)</b> |                                                                                  |                     |
| DATE EFFECTIVE:                                                                       | 07/01/2017                                               | 606.80C                                                                          | SHEET NO.<br>6 OF 7 |
| DATE PREPARED:                                                                        | 5/1/2017                                                 |                                                                                  |                     |

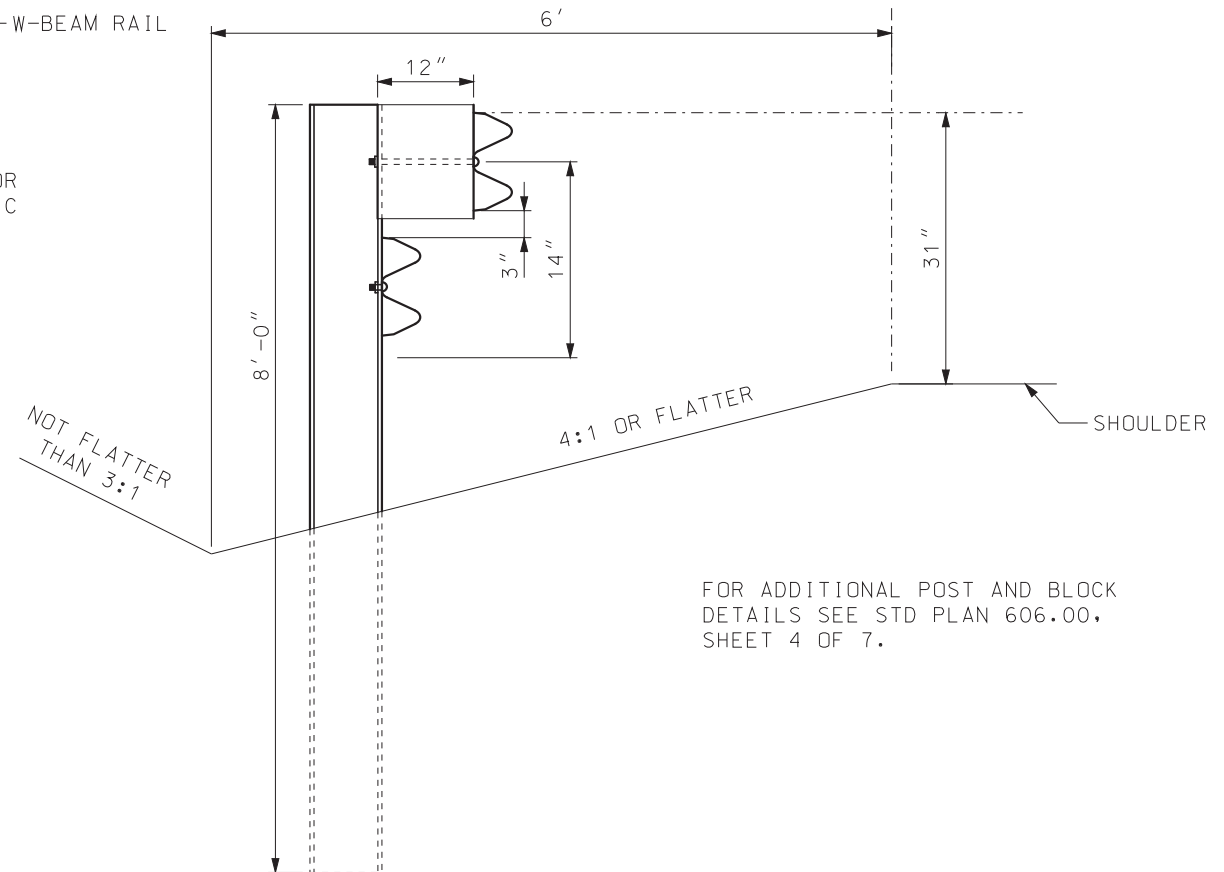




ELEVATION OF 6' STEEL POST AND BLOCK

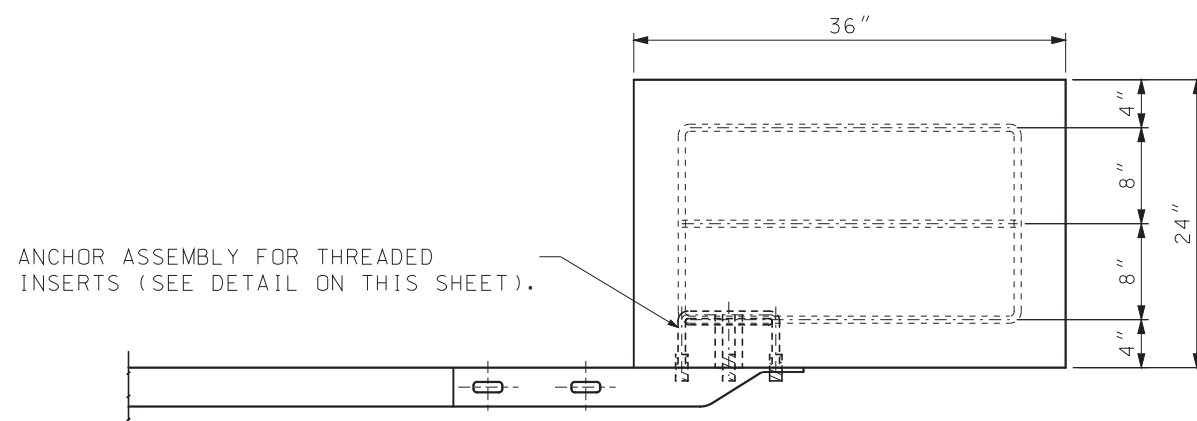


PLAN VIEW

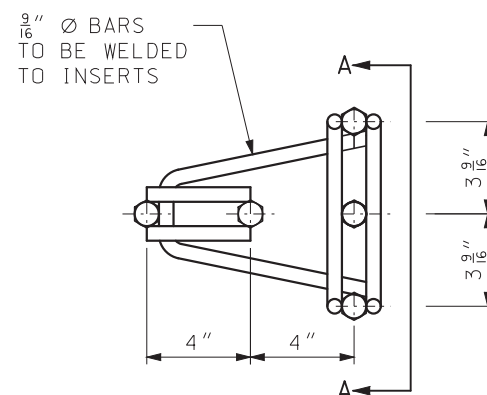


ELEVATION 8' STEEL POST AND BLOCK

FOR ADDITIONAL POST AND BLOCK DETAILS SEE STD PLAN 606.00, SHEET 4 OF 7.

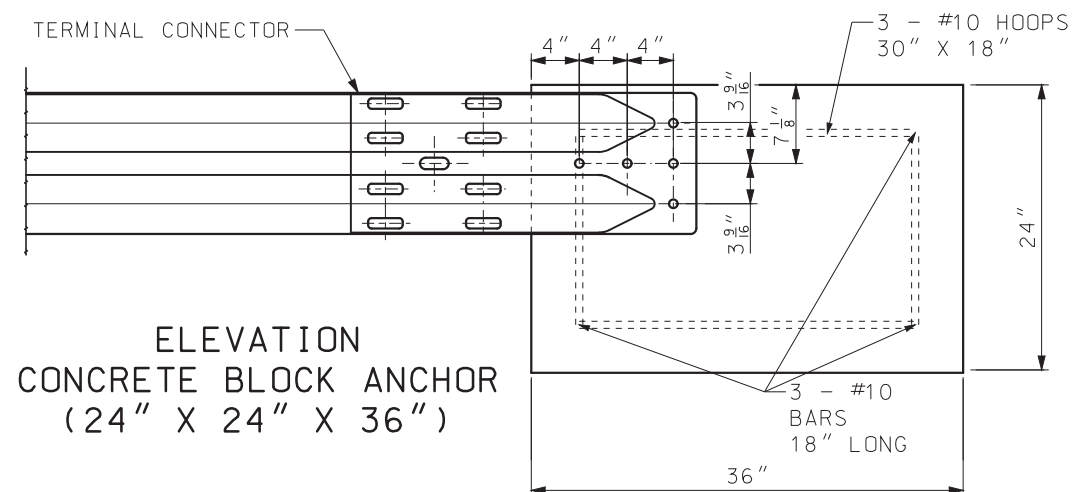


TOP VIEW

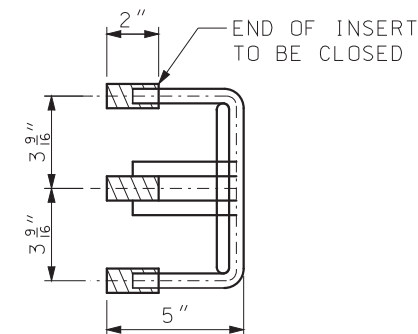


CONCRETE BLOCK ANCHOR ANCHOR ASSEMBLY

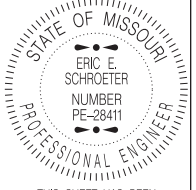
THREADED INSERTS FOR  $\frac{15}{16}$ " X 2" GALVANIZED HEX HEAD CAP SCREWS. CAP SCREWS TO BE THREADED A MINIMUM  $1\frac{7}{8}$ ". INSERTS THREADED MINIMUM OF  $1\frac{3}{4}$ ".

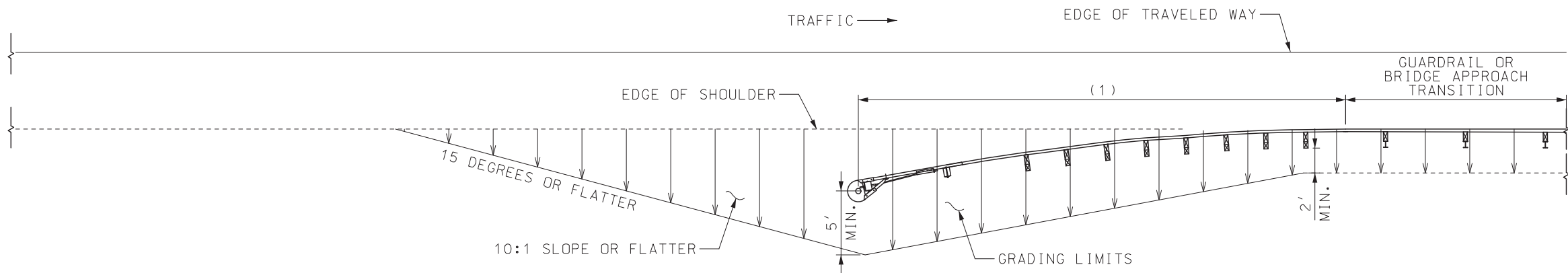


ELEVATION CONCRETE BLOCK ANCHOR (24" X 24" X 36")

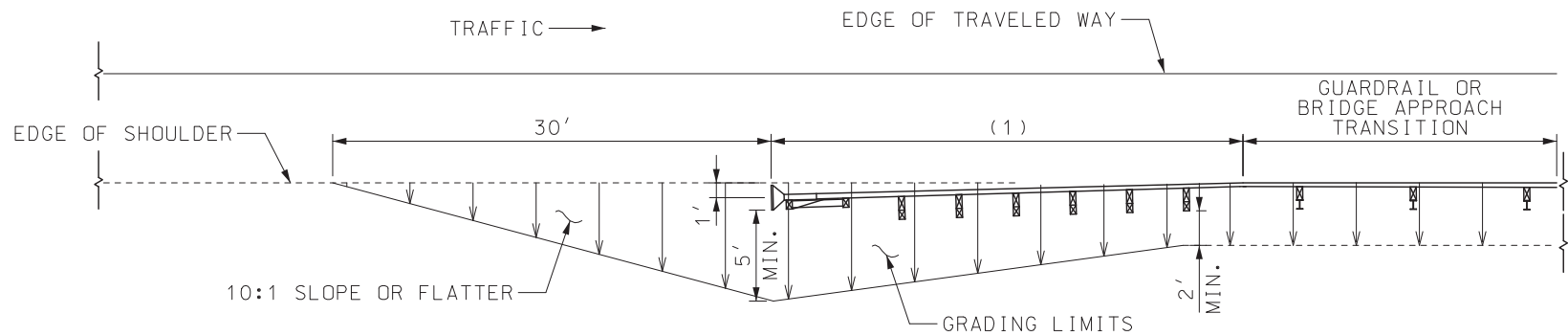


SECTION A-A

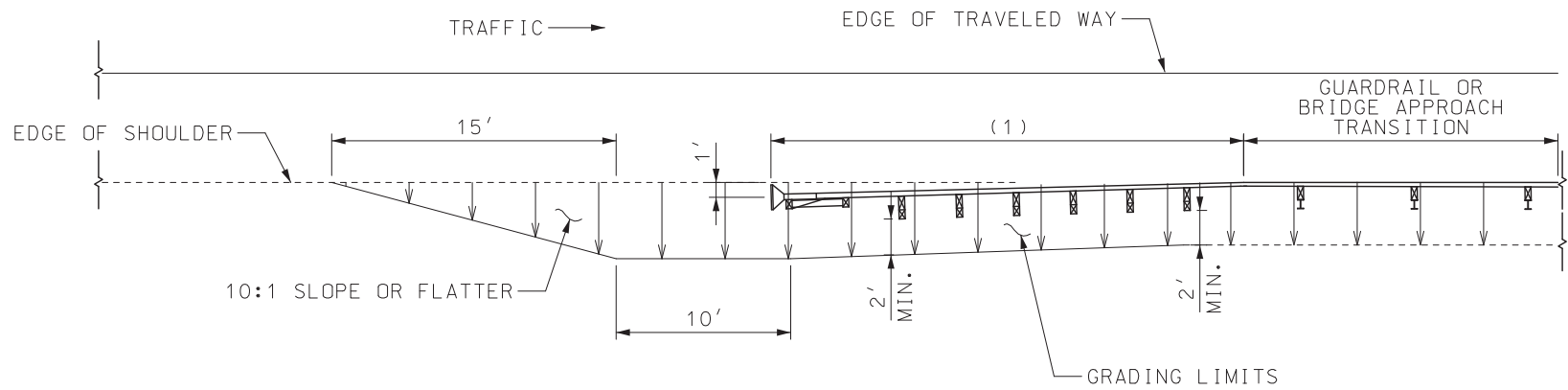
|                                                                                                                                                                                                                                  |                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                  |
|                                                                                                                                             | <b>MIDWEST GUARDRAIL SYSTEM (MGS)</b><br><b>EMBEDDED TERMINAL ENDS</b><br><b>GENERAL DETAILS</b> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | SHEET NO.<br><b>7 OF 7</b>                                                                       |



GRADING LIMITS FOR FLARED CRASHWORTHY END TERMINALS



STANDARD GRADING LIMITS FOR CRASHWORTHY END TERMINALS



ALTERNATE GRADING LIMITS FOR CRASHWORTHY END TERMINALS

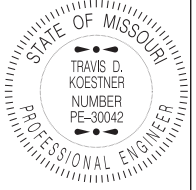
GENERAL NOTES:

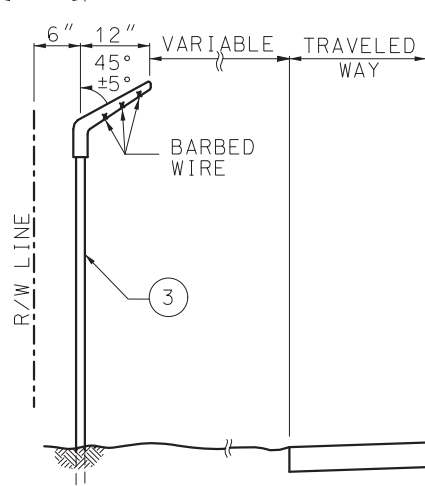
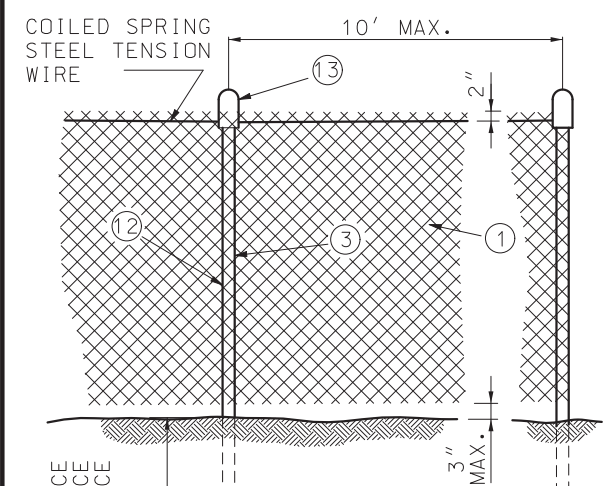
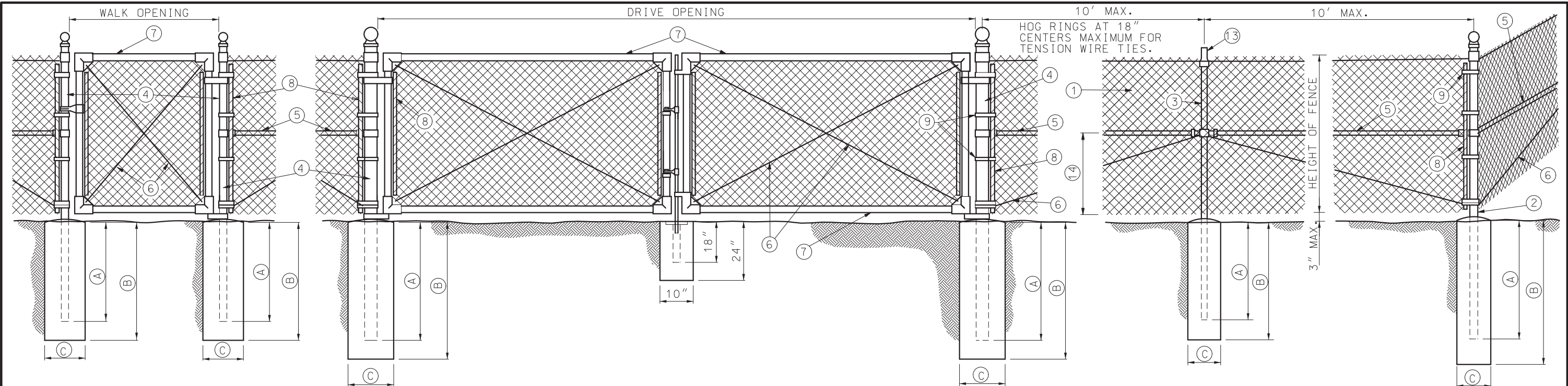
STANDARD GRADING LIMITS SHALL BE USED WHEN CONSTRUCTING A NEW ROADBED. ALTERNATE GRADING LIMITS ARE ALLOWABLE ON EXISTING ROADBEDS EXCEPT WHEN STANDARD GRADING IS INDICATED ON THE PLANS.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH APPROVED SHOP DRAWINGS OF THE MASH APPROVED CRASHWORTHY END TERMINAL.

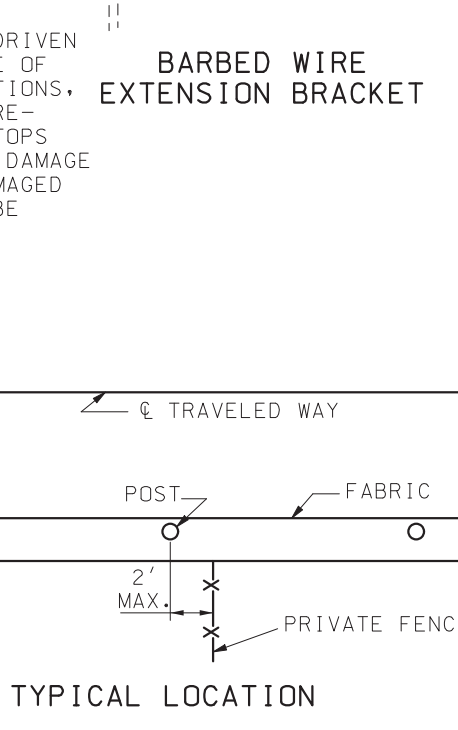
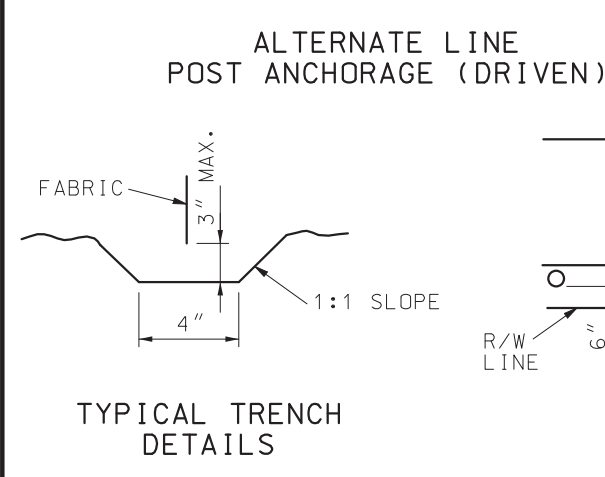
END ANCHORS SHALL BE INSTALLED ON ENDS OF GUARDRAIL RUNS WHERE CRASHWORTHY END TERMINALS ARE NOT REQUIRED.

(1) APPROVED CRASHWORTHY END TERMINAL

|                                                                                                                                                                                                                                                                                                              |                                                                                                           |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                             |                                                                                                           |                     |
|  <p>STATE OF MISSOURI<br/>         TRAVIS D. KOESTNER<br/>         NUMBER PE-30042<br/>         PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>         SIGNED, SEALED AND DATED<br/>         ELECTRONICALLY.</p> | <p><b>MASH<br/>         CRASHWORTHY END TERMINALS<br/>         TYPE A<br/>         GRADING LIMITS</b></p> |                     |
| DATE EFFECTIVE: 10/01/2019<br>DATE PREPARED: 7/18/2019                                                                                                                                                                                                                                                       | 606.81B                                                                                                   | SHEET NO.<br>1 OF 1 |



NOTE: IF POSTS CANNOT BE DRIVEN TO DEPTHS INDICATED BECAUSE OF ROCKY SOILS OR OTHER CONDITIONS, THEY SHALL BE REMOVED AND REPLACED IN FOOTINGS. POST TOPS SHALL BE PROTECTED AGAINST DAMAGE AND ALL POSTS WHICH ARE DAMAGED DURING INSTALLATION SHALL BE REMOVED AND REPLACED.

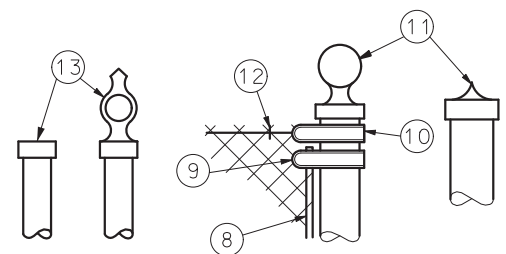


| DESCRIPTION             |     | HEIGHT OF FENCE |            |            |
|-------------------------|-----|-----------------|------------|------------|
|                         |     | 48"             | 60"        | 72"        |
|                         |     | SIZE (IN.)      | SIZE (IN.) | SIZE (IN.) |
| ② ENDCORNER & PULL POST | (A) | 30              | 36         | 36         |
|                         | (B) | 36              | 42         | 42         |
|                         | (C) | 10              | 12         | 12         |
| ③ LINE POST             | (A) | 24              | 27         | 36         |
|                         | (B) | 30              | 36         | 42         |
|                         | (C) | 10              | 12         | 12         |
| ④ GATE POST             | (A) | 30              | 36         | 36         |
|                         | (B) | 36              | 42         | 42         |
|                         | (C) | 10              | 12         | 12         |

| WIRE SIZE AND HEIGHT OF FABRIC |      |             |                         |
|--------------------------------|------|-------------|-------------------------|
| SPECIFIED DIAMETER             |      |             | HEIGHT OF FABRIC INCHES |
| INCHES                         | GAGE | MESH INCHES |                         |
| 0.120                          | 11   | 2           | 36, 42                  |
| 0.148                          | 9    | 2           | 48, 60                  |
| 0.192                          | 6    | 2           | 72, 84                  |

- LEGEND
- ① FABRIC
  - ② END, CORNER OR PULL POST
  - ③ LINE POST
  - ④ GATE POST
  - ⑤ BRACE
  - ⑥ TRUSS ROD
  - ⑦ GATE FRAME
  - ⑧ STRETCHER BAR 1/4" X 3/4" PLATE
  - ⑨ STRETCHER BAR BAND
  - ⑩ END OR CORNER CLAMP
  - ⑪ POST TOPS (OTHER THAN LINE POSTS)
  - ⑫ FABRIC TIES
  - ⑬ LINE POST TOPS WITH OR WITHOUT TOP RAILS
  - ⑭ ONE-HALF FABRIC HEIGHT OR AS RECOMMENDED BY MANUFACTURER

| MINIMUM SIZE FOR FENCE HARDWARE               |       |            |        |
|-----------------------------------------------|-------|------------|--------|
|                                               | WIDTH | DIA. (IN.) | LBS/FT |
| ② END CORNER OR PULL POST                     | N/A   | 2 1/2      | 5.79   |
| ③ LINE POST                                   | N/A   | 2          | 3.65   |
| ④ GATE POST (SINGLE GATE OR 1 LEAF OF DOUBLE) | ≤ 6'  | 2 1/2      | 5.79   |
|                                               | ≤ 13' | 3 1/2      | 9.10   |
|                                               | ≤ 18' | 6          | 18.97  |
|                                               | > 18' | 8          | 24.70  |
| ⑤ BRACE                                       | N/A   | 1 1/4      | 2.27   |
| ⑥ TRUSS ROD                                   | N/A   | 3/8        | -      |
| ⑦ GATE FRAME                                  | N/A   | 1 1/2      | 2.72   |



POST TOPS TO BE PRESSURE FITTED OR SCREWED. POST TOPS MAY BE ELIMINATED FOR ALL POSTS EXCEPT PIPE POSTS. IF POST TOPS ARE ELIMINATED, POST LENGTH SHALL BE INCREASED 3".

GENERAL NOTES:

WEIGHTS OF MATERIALS SHOWN IN TABLE ARE FOR ASTM F 1043, GROUP 1A. NOMINAL INSIDE DIAMETER SIZES SHOWN ARE FOR STEEL AND ALUMINUM. EQUIVALENT ASTM F 1043 ALTERNATIVES MAY BE USED.

PULL POSTS SHALL BE USED AT SHARP BREAKS IN VERTICAL GRADE OR AT APPROXIMATE 500' CENTERS ON STRAIGHT RUNS OR AS DIRECTED BY THE ENGINEER.

DRILLED HOLES (C) IN SOLID ROCK SHALL PROVIDE A DIAMETER OF NOT LESS THAN 2" GREATER THAN THE MAXIMUM TRANSVERSE DIMENSION OF THE POST SECTION.

ALL POSTS SHALL HAVE PROVISIONS TO SECURELY HOLD THE TOP TENSION WIRE IN POSITION AND ALLOW FOR REMOVAL AND REPLACEMENT OF A POST WITHOUT DAMAGING THE TOP TENSION WIRE.

THE MESH SIZE SHALL BE 2 INCHES ± 1/8 IN. MEASURED IN EITHER DIRECTION AS THE MINIMUM CLEAR DISTANCE BETWEEN THE WIRES FORMING THE PARALLEL SIDES OF THE MESH.



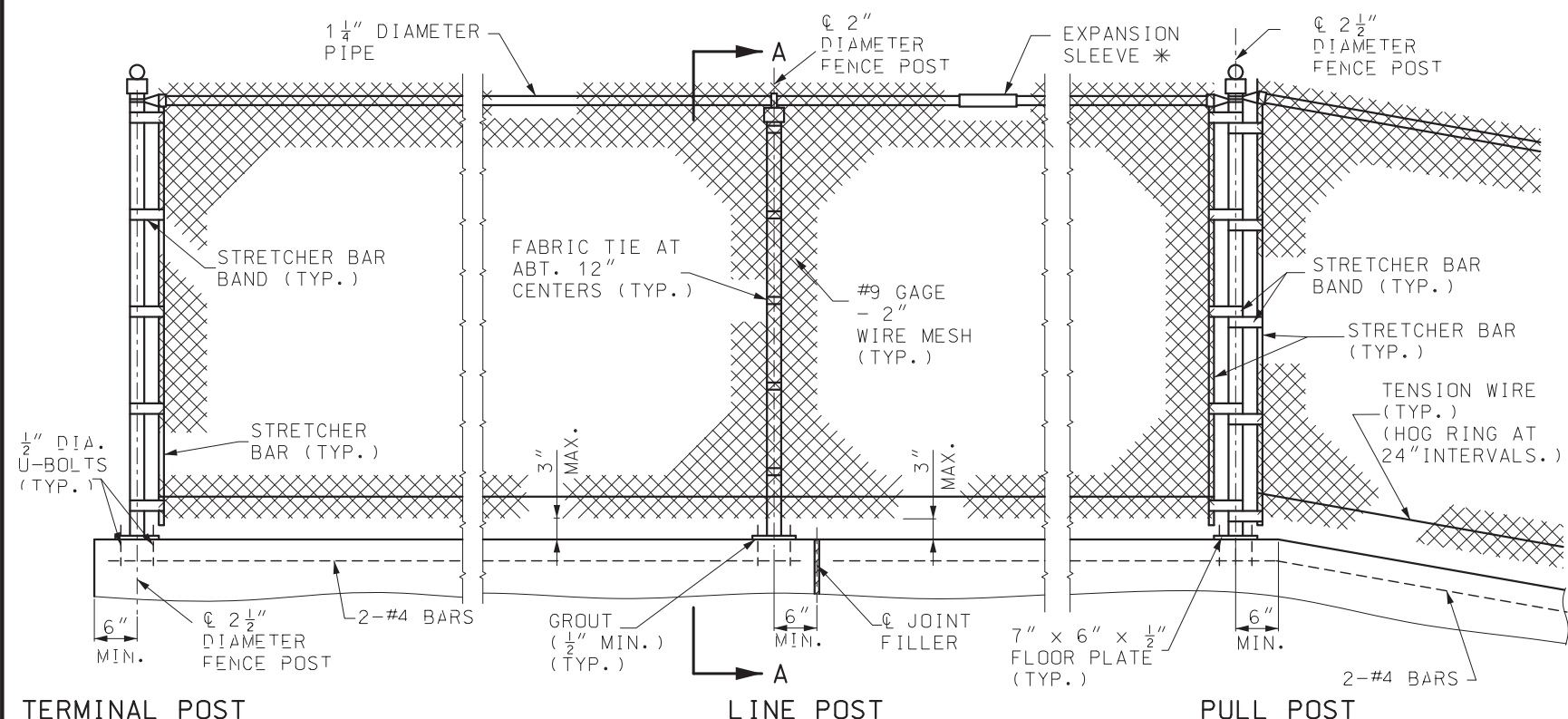
**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**CHAIN-LINK FENCE**

|                 |           |                |                            |
|-----------------|-----------|----------------|----------------------------|
| DATE EFFECTIVE: | 4/1/2024  | <b>607.10W</b> | SHEET NO.<br><b>1 OF 1</b> |
| DATE PREPARED:  | 1/16/2024 |                |                            |



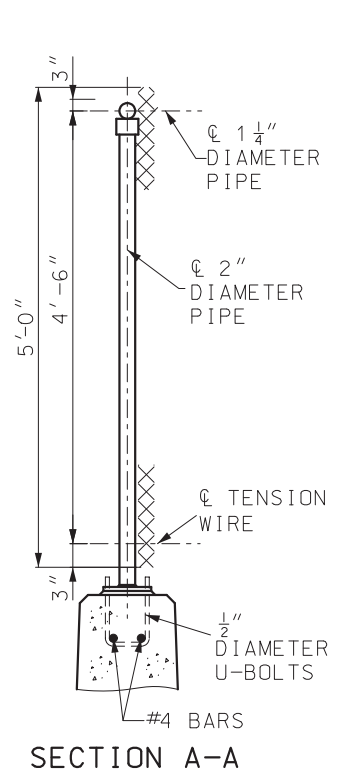
TERMINAL POST

LINE POST

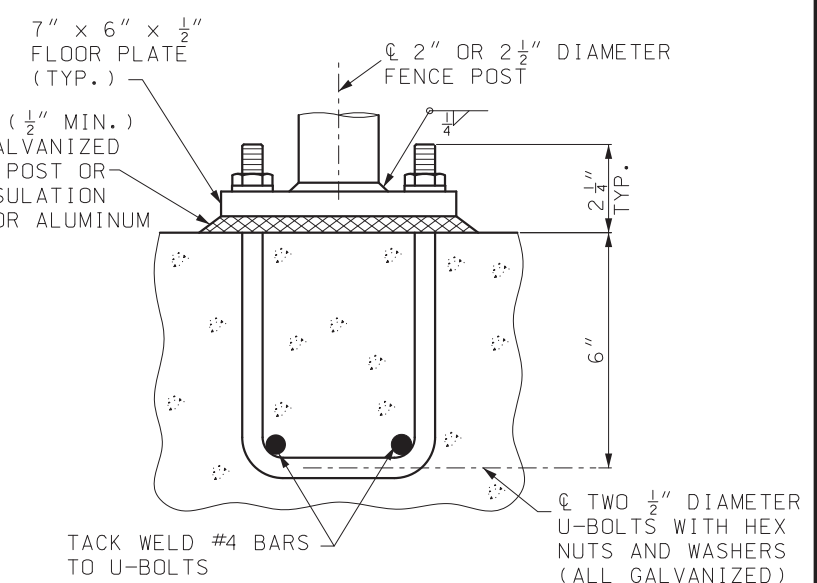
PULL POST

PART ELEVATION  
(TYPICAL)

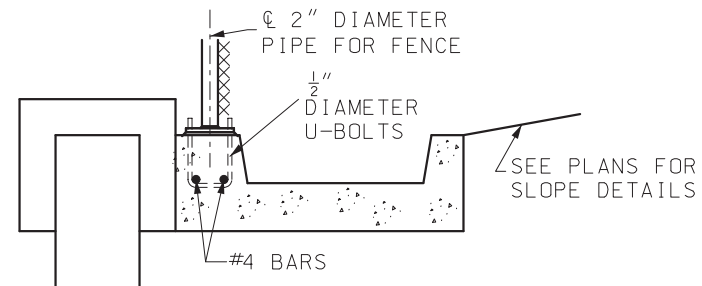
\* PLACE EXPANSION SLEEVE AT ABOUT 30'-0" CENTERS WITH AT LEAST ONE EXPANSION SLEEVE BETWEEN PULL POSTS.



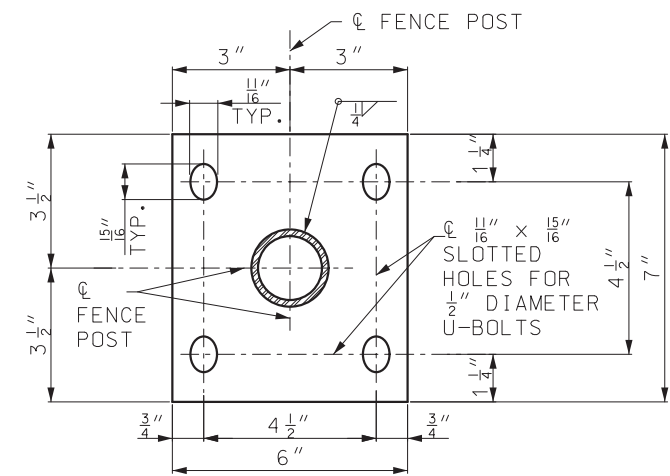
SECTION A-A



TYPICAL FENCE POST CONNECTION



ALTERNATE SECTION A-A  
FOR MSE WALLS



PLAN OF FLOOR PLATE

GENERAL NOTES:

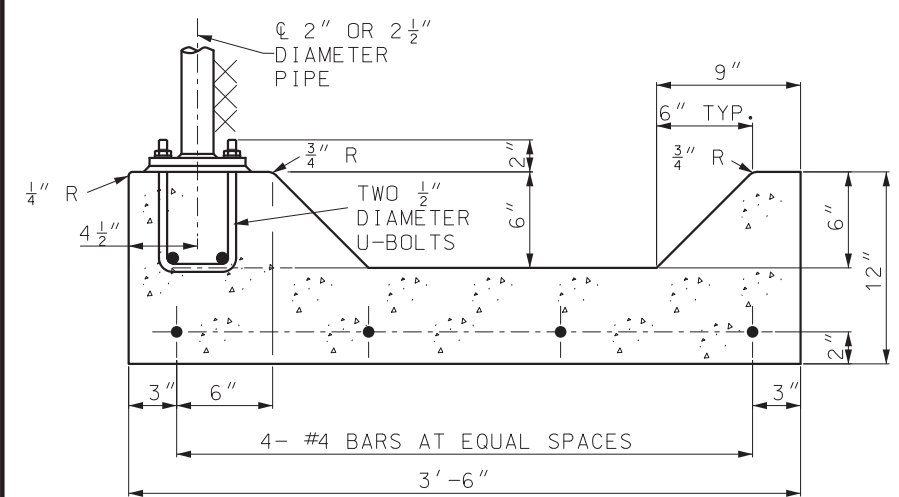
PAYMENT FOR U-BOLTS WITH NUTS, WASHERS, AND #4 BARS WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR CHAIN-LINK FENCE (RETAINING WALLS).

PULL POST SHALL BE USED AT SHARP BREAKS IN VERTICAL GRADE OR AT APPROXIMATE 100'-0" CENTERS ON STRAIGHT RUNS.

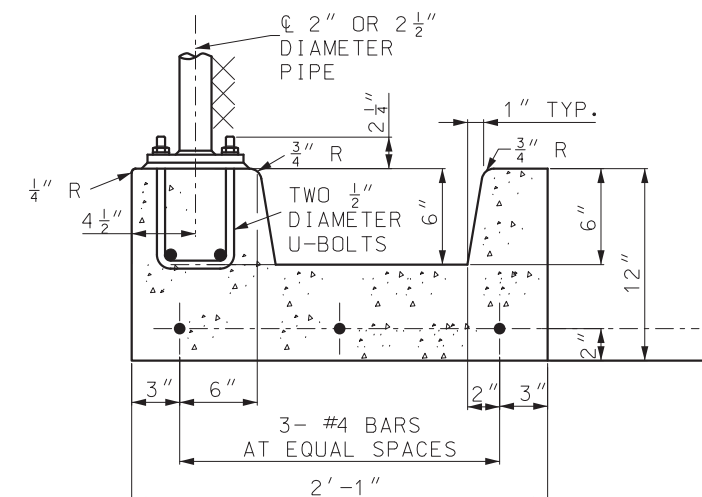
THE CHAIN-LINK FENCE SHALL BE IN ACCORDANCE WITH APPLICABLE PARTS OF SEC 607.

MAXIMUM POST SPACING IN HORIZONTAL DIRECTION SHALL BE 10'-0".

PIPE POST SIZES ARE NOMINAL INSIDE DIAMETERS.



MODIFIED TYPE A GUTTER

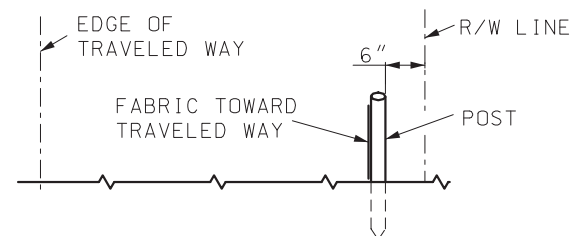
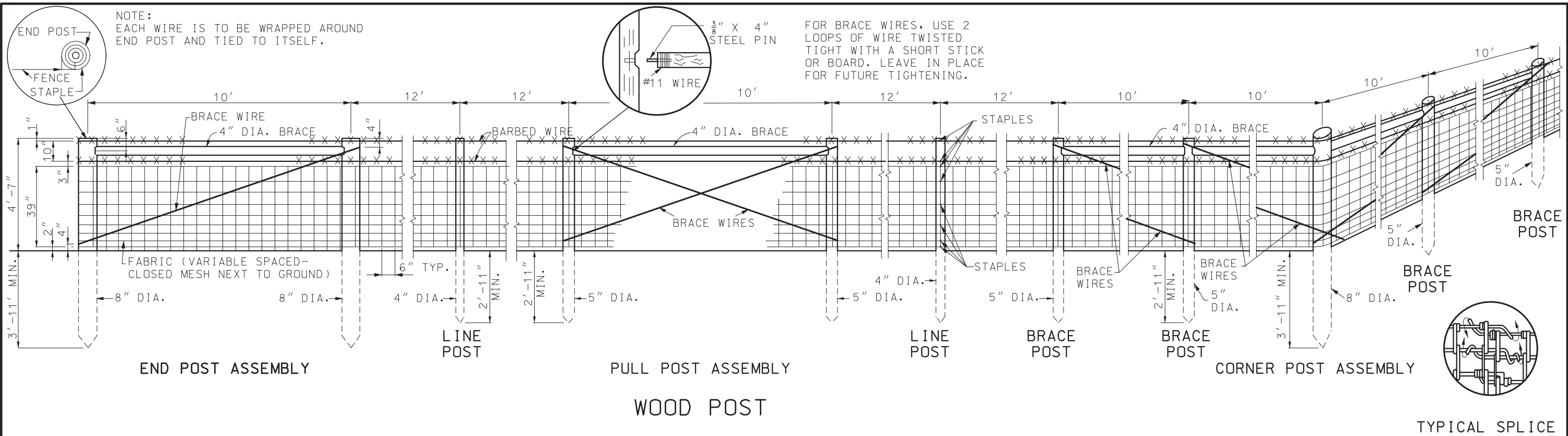


MODIFIED TYPE B GUTTER

FENCE CONNECTION FOR MSE WALLS

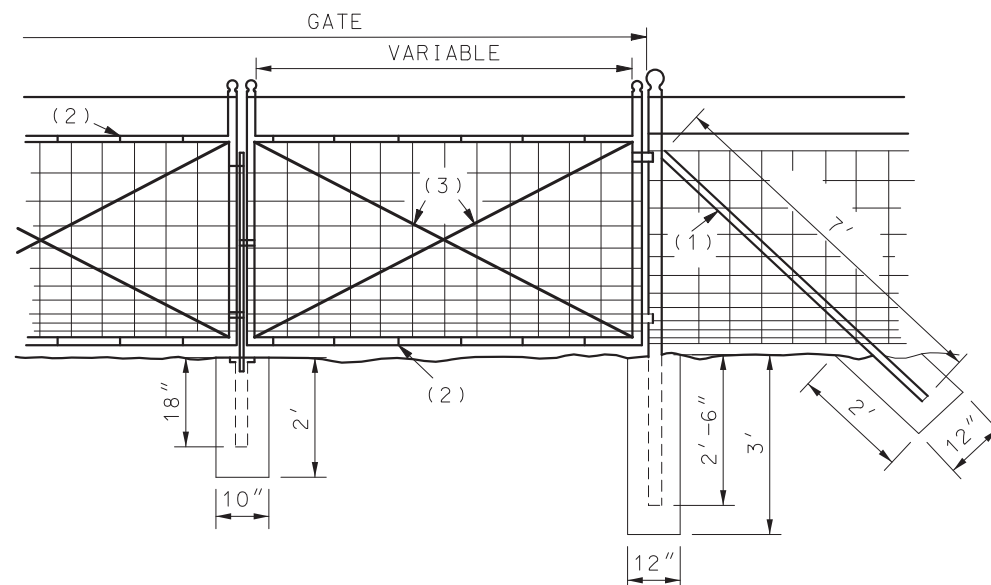
|                                                                                                                                                                                                                                  |                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                             |
|                                                                                                                                             | <b>CHAIN-LINK FENCE FOR RETAINING WALLS</b> |
| DATE EFFECTIVE: 4/1/2024<br>DATE PREPARED: 1/16/2024                                                                                                                                                                             | <b>607.11J</b><br>SHEET NO. 1 OF 1          |





TYPICAL FENCE LOCATION

| GATE OPENING | GATE POST SIZE (NOM. I.D.) | LBS/FT |
|--------------|----------------------------|--------|
| ≤ 6'         | 2"                         | 3.65   |
| ≤ 13'        | 2 1/2"                     | 5.79   |
| ≤ 18'        | 3 1/2"                     | 9.10   |
| > 18'        | 6"                         | 18.97  |
| GATE FRAME   | 1 1/2"                     | 2.72   |



- BRACES
- WIRE TIES
- 3.8" ADJUSTABLE TRUSS RODS.

#### GENERAL NOTES:

STEEL LINE POSTS SHALL BE OF AN APPROVED "U", "Y", "T" OR CHANNEL SECTION, NOTCHED OR STUDDED WITH AN ANCHOR PLATE. POST PUNCHED WITH HOLES OR SELF FASTENING LUGS WILL NOT BE PERMITTED.

STAPLES SHALL BE SCREW SHANK TYPE OR EQUIVALENT (1 1/4" MINIMUM LENGTH).

STRETCHED FABRIC AND BARBED WIRE ON OUTSIDE OF POST ON CORNERS AND CURVES.

ATTACHMENT OF FABRIC TO STEEL LINE POSTS IN ACCORDANCE WITH MANUFACTURE'S RECOMMENDATION.

GATES FOR WOVEN WIRE FENCE SHALL BE IN ACCORDANCE WITH SEC 607.20 AND 1043.3.6 OF THE STANDARD SPECIFICATIONS. EXCEPT THE FILLER SHALL BE WOVEN WIRE FABRIC OF THE SAME KIND AS USED FOR THE FENCE.

SINGLE LEAF GATES REQUIRE UP TO 12" OPENING. DOUBLE LEAF GATES REQUIRE OVER 12" OPENING. DIRECTION OF SWING OF GATES SHALL BE AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**WOVEN WIRE FENCE**



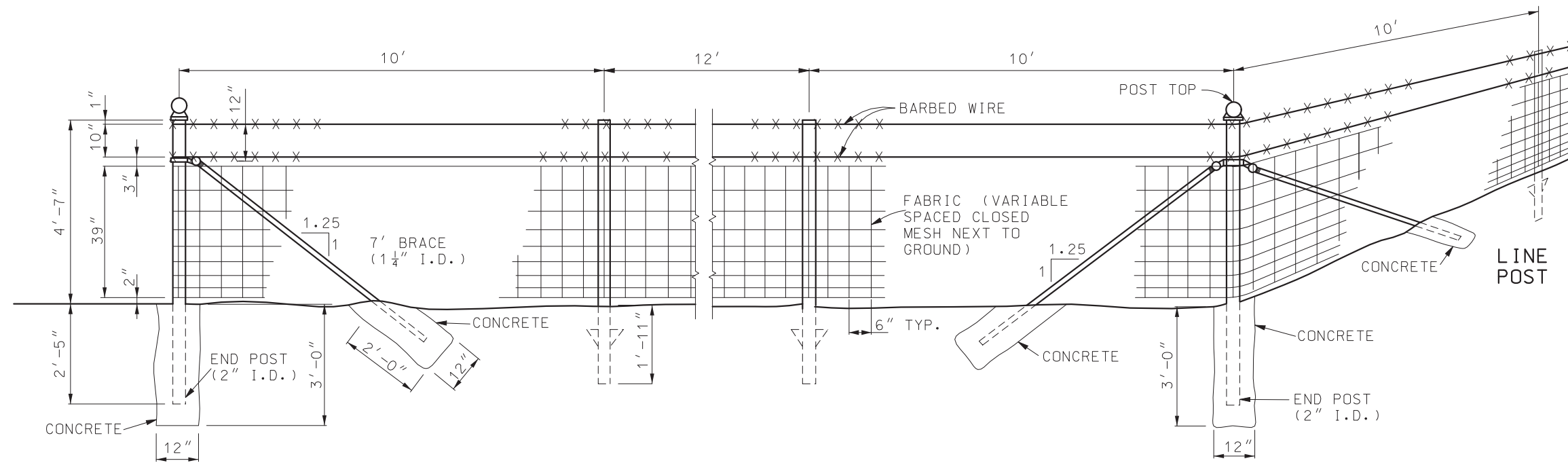
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

DATE EFFECTIVE: 4/1/2024

DATE PREPARED: 1/16/2024

607.20H

SHEET NO.  
1 OF 2

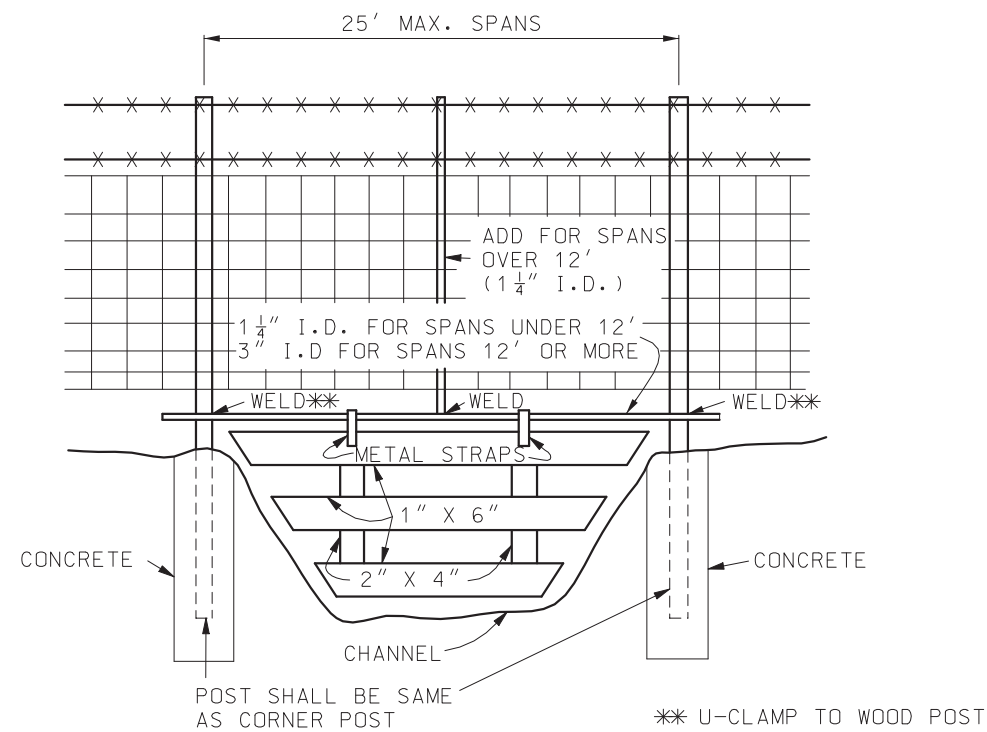


END POST ASSEMBLY

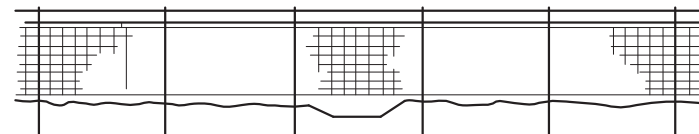
LINE POST

CORNER OR PULL POST ASSEMBLY

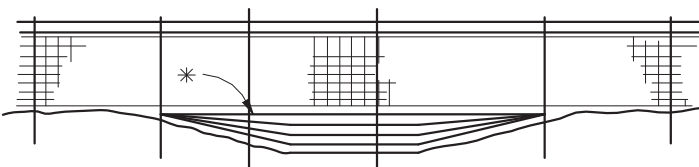
## STEEL POST



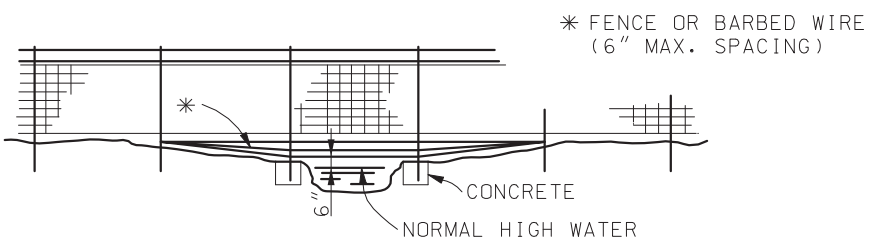
TYPICAL  
WATER CROSSING GATE



ROADWAY DITCHES OR SMALL SHALLOW CHANNELS  
(SPAN WITH NORMAL LINE POST SPACING)



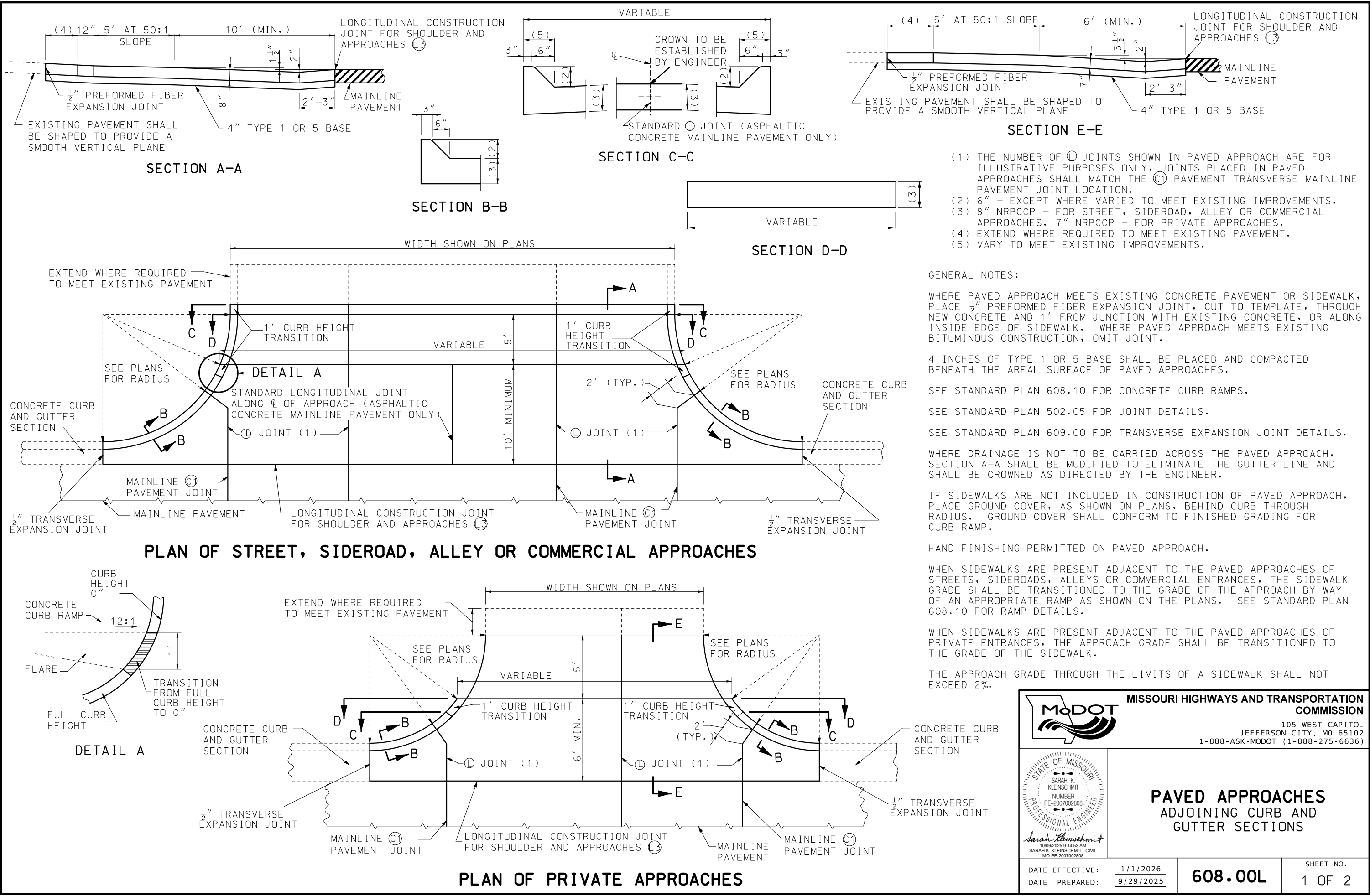
POORLY DEFINED CHANNELS (SMALL DRAINAGE AREAS)



WELL DEFINED CHANNELS (LARGE DRAINAGE AREAS)

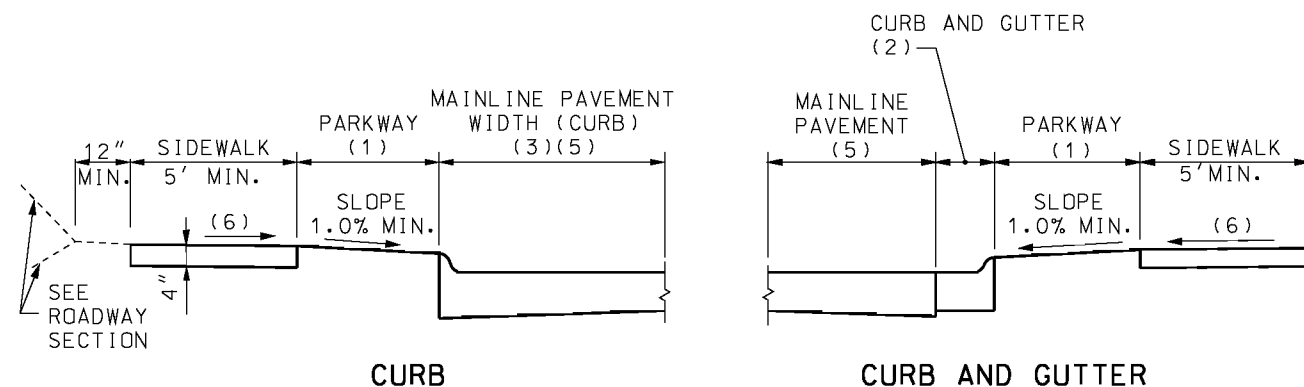
TYPICAL FENCING AT  
CHANNEL CROSSING

|                                                                                                                                                                                                                                  |                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                             |
|                                                                                                                                             | <b>WOVEN WIRE FENCE</b>     |
| DATE EFFECTIVE: 4/1/2024<br>DATE PREPARED: 1/16/2024                                                                                                                                                                             | 607.20H<br>SHEET NO. 2 OF 2 |

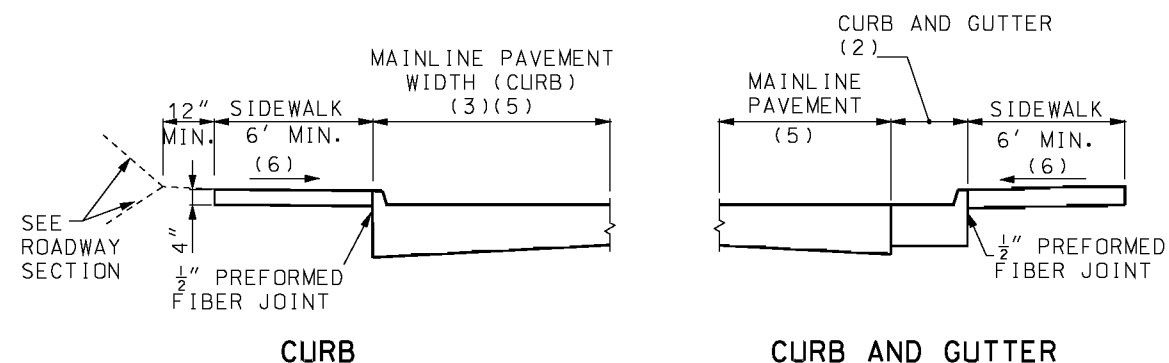




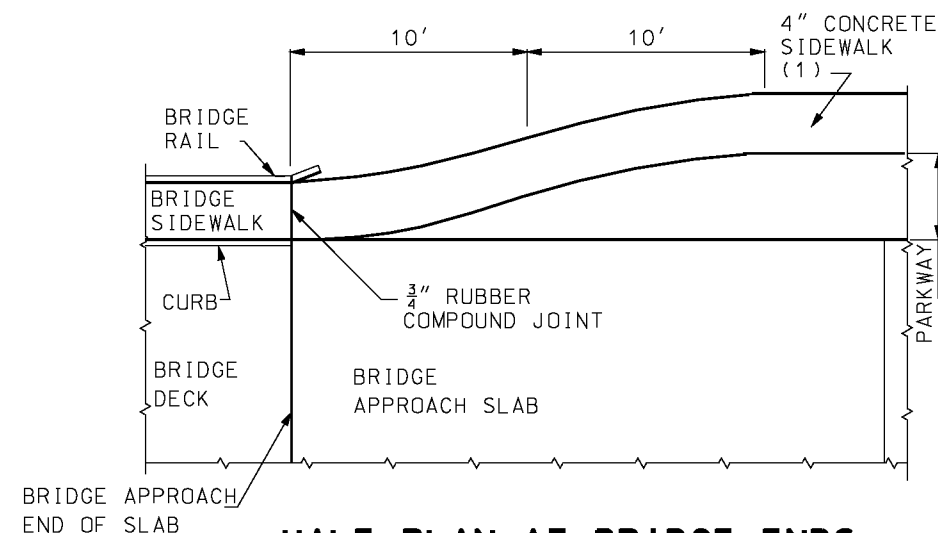




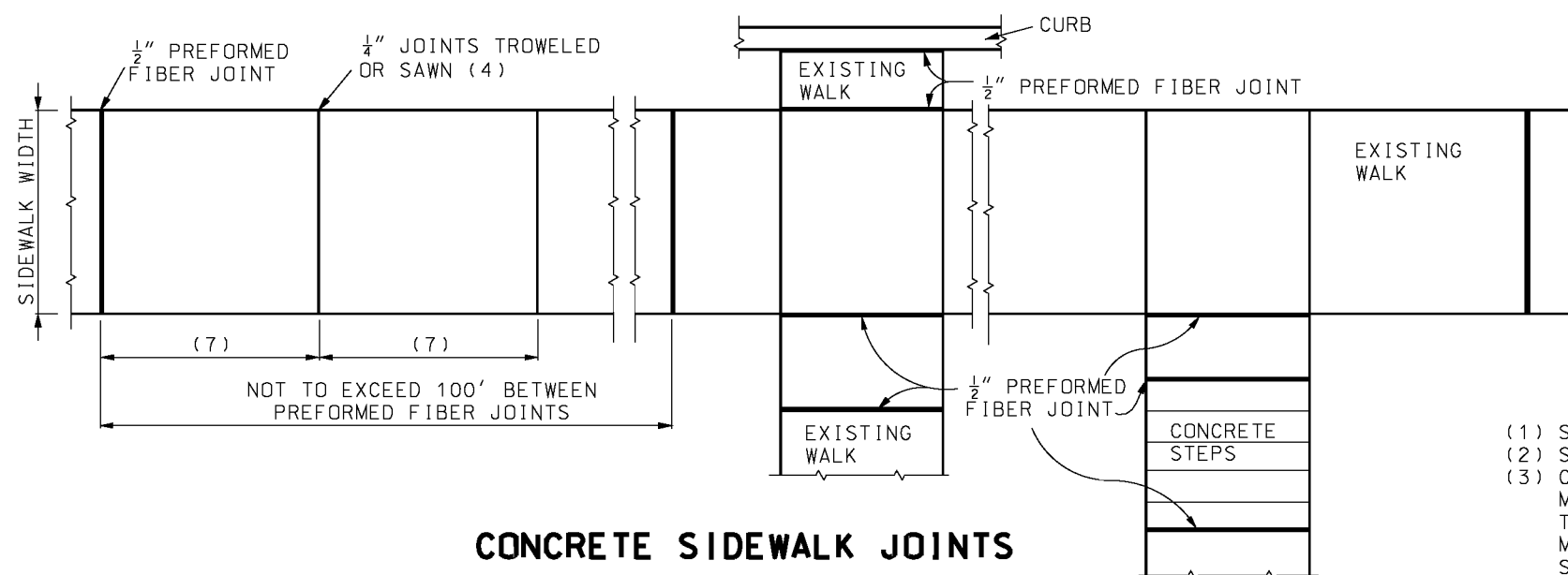
**TYPICAL SIDEWALK WITH PARKWAY 2' OR MORE**



**TYPICAL SIDEWALK WITH NO PARKWAY**



**HALF PLAN AT BRIDGE ENDS**



**CONCRETE SIDEWALK JOINTS**

- (1) SEE PLANS FOR WIDTH
- (2) SEE STANDARD 608.00
- (3) CURB TO BE MONOLITHIC WITH PCC MAINLINE PAVEMENT. CURB TO BE TYPE S WITH ASPHALT CONCRETE MAINLINE PAVEMENT. SEE STANDARD PLAN 609.00.
- (4) MIN. 1/2" DEPTH JOINT.
- (5) SEE TYPICAL PAVEMENT SECTION
- (6) SLOPE 1.0% (2.0% MAX.)
- (7) SPACING EQUAL TO WIDTH OF WALK

**GENERAL NOTES:**

ALL AREAS OF THE PEDESTRIAN ACCESS ROUTE MUST BE COMPLIANT WITH THE AMERICANS WITH DISABILITIES ACT - GUIDELINES FOR ACCESSIBLE PUBLIC RIGHTS OF WAY. EXCEPTIONS MUST BE APPROVED BY THE ENGINEER. ALL OTHER AREAS OF NON-COMPLIANCE SHALL BE REMOVED AND CORRECTED AT THE CONTRACTOR'S EXPENSE.

THE SURFACES OF PEDESTRIAN ACCESS ROUTES AND ELEMENTS, AND SPACES REQUIRED TO CONNECT TO PEDESTRIAN ACCESS ROUTES, SHALL BE FIRM, STABLE, SLIP RESISTANT, AND SHALL NOT POND WATER.

WHERE SIDEWALKS ARE LESS THAN 5 FT., 5 FT. X 5 FT. PASSING SPACES EVERY 200 FT. SHALL BE PROVIDED AND ARE PERMITTED TO OVERLAP PEDESTRIAN ACCESS ROUTES.

THE CROSS SLOPE OF THE CONTINUOUS PEDESTRIAN ACCESS ROUTE THROUGH ENTRANCES, ALLEYS, AND SIDEROAD CONNECTIONS WITH STOP OR YIELD CONTROL SHALL BE 1.00% TO FACILITATE DRAINAGE (2.00% MAX.).

WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN PEDESTRIAN STREET CROSSINGS WITHOUT YIELD OR STOP CONTROL, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE 5.00% MAXIMUM.

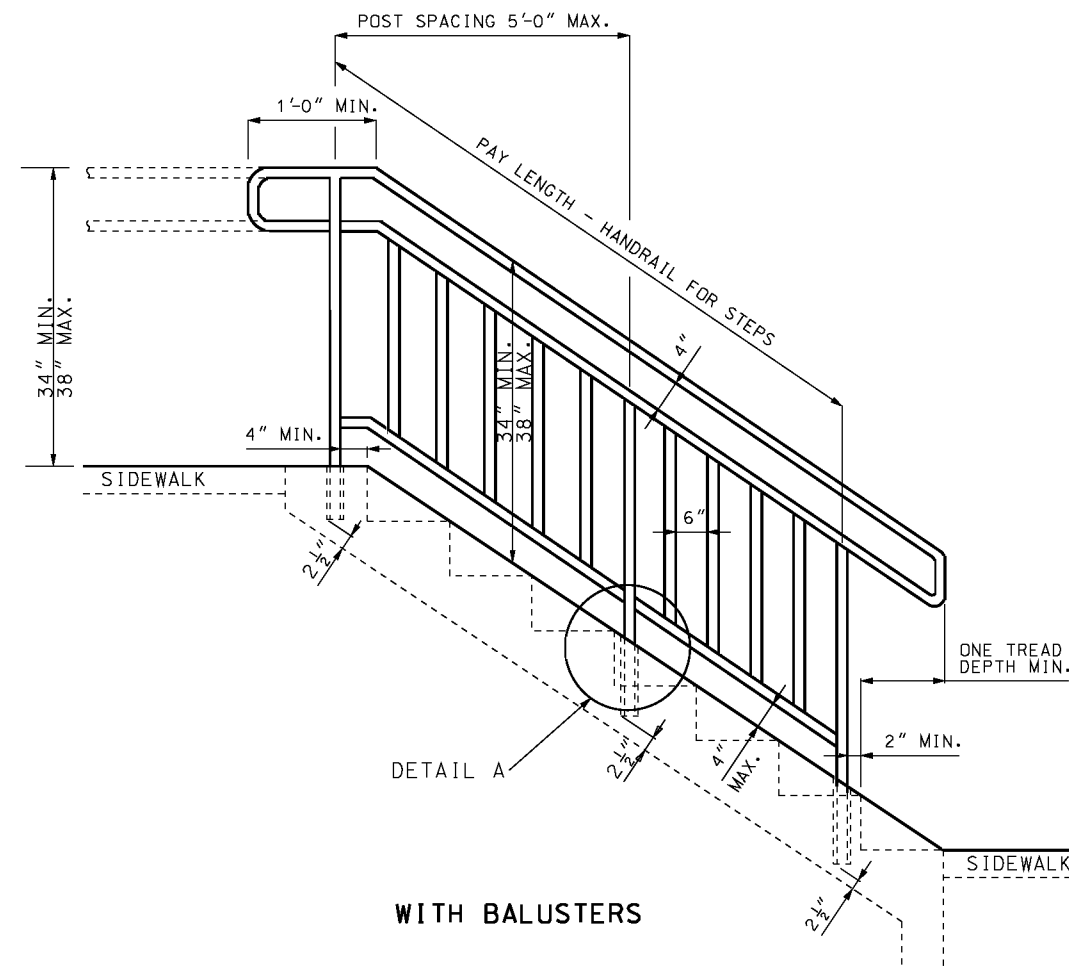
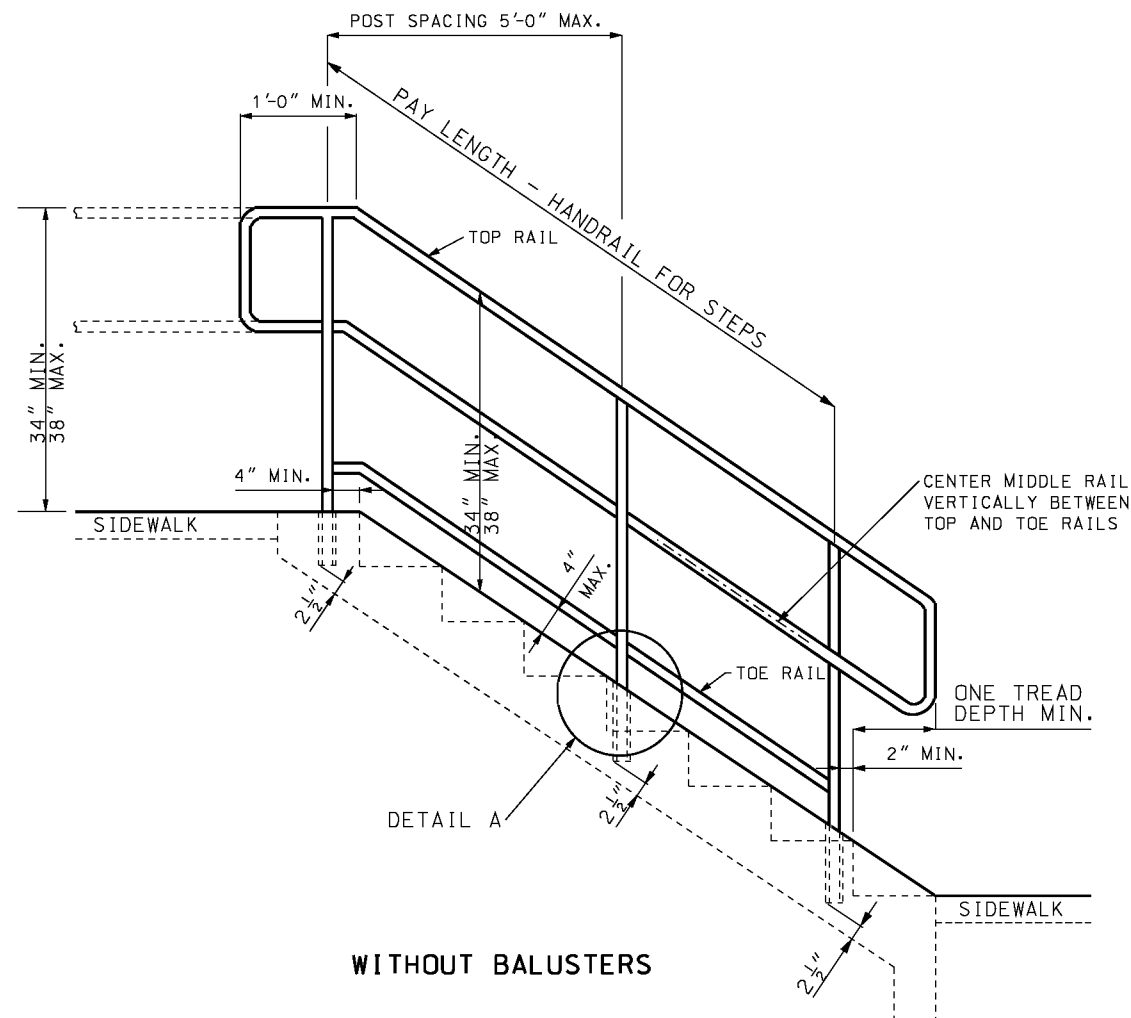
WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN MIDBLOCK PEDESTRIAN STREET CROSSINGS, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE PERMITTED TO EQUAL THE STREET OR HIGHWAY GRADE.

STORMWATER INLETS, SIGNS, POSTS, MANHOLE COVERS, PULL BOXES AND OTHER ACCESS LIDS SHOULD BE AVOIDED WITHIN THE SIDEWALK. IF SUCH A LOCATION IS NECESSARY, THE FEATURE MUST MEET ADA STANDARDS.

THE RUNNING GRADE OF A SIDEWALK SHALL NOT EXCEED 5.0% UNLESS IT IS MATCHING THE GRADE OF THE ADJACENT ROADWAY.

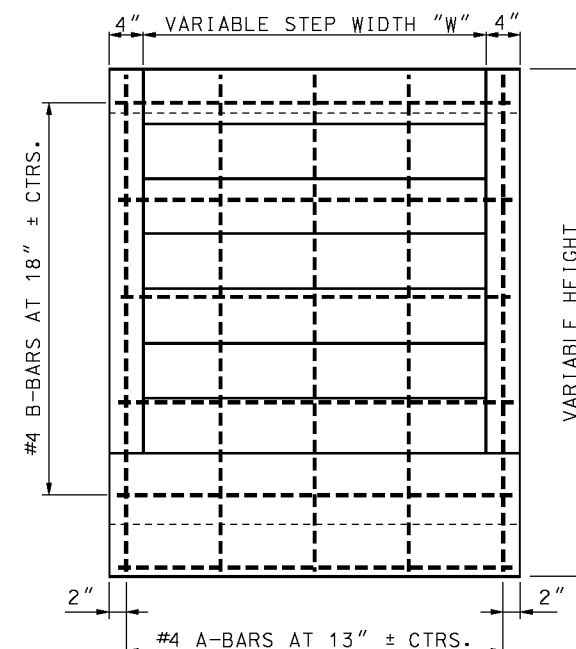
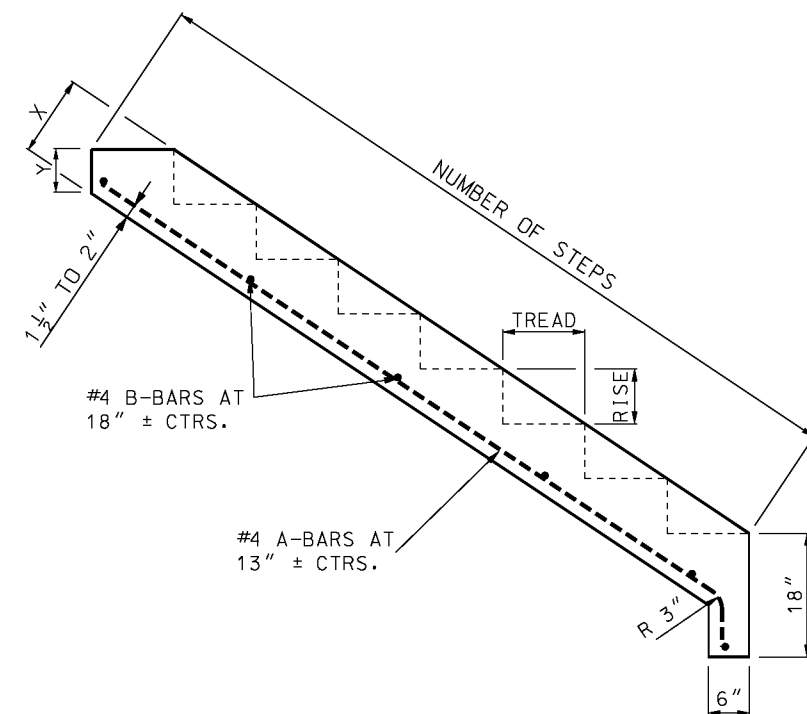
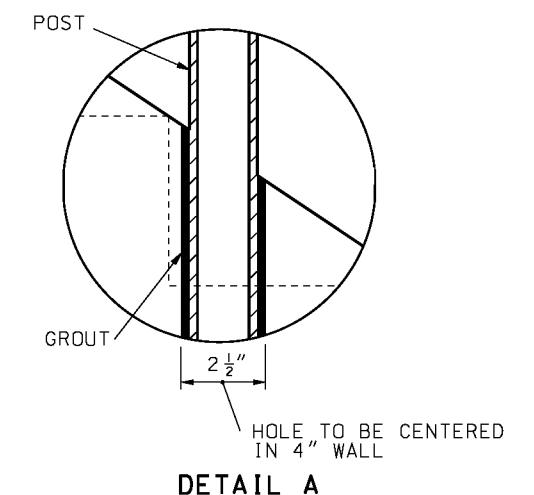
PEDESTRIAN ACCESS ROUTE SHALL CONTINUE ACROSS RESIDENTIAL AND COMMERCIAL ENTRANCES, ALLEYS, AND SIDEROAD CONNECTIONS.

|                                                                                                                                                                                                                                  |                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                          |
|                                                                                                                                             | <b>CONCRETE SIDEWALK</b> |
| DATE EFFECTIVE: 04/01/2015<br>DATE PREPARED: 2/20/2015                                                                                                                                                                           | <b>608.10P</b>           |
| SHEET NO. 1 OF 1                                                                                                                                                                                                                 |                          |



| RAILING & POST SPECIFICATIONS |             |                   |       |
|-------------------------------|-------------|-------------------|-------|
| TYPE                          | SIZE (DIA.) | WEIGHT (LBS./FT.) |       |
|                               |             | ALUM.             | STEEL |
| ROUND                         | 1 1/2"      | 0.940             | 2.72  |
| SQUARE                        | 2" X 2"     | 1.3094            | 4.31  |

| STEP DIMENSIONS |         |        |          |         |
|-----------------|---------|--------|----------|---------|
| SLOPE           | TREAD   | RISE   | X        | Y       |
| 1:1.5           | 10 1/2" | 7"     | 10 3/16" | 5 1/4"  |
| 1:2             | 12"     | 6"     | 10 3/8"  | 5 9/16" |
| 1:3             | 14 1/4" | 4 3/4" | 9 1/2"   | 5 1/4"  |



## SAFETY RAIL DETAILS

### GENERAL NOTES:

STAIRWAY SHALL HAVE SAFETY RAILS AT BOTH SIDES OF ALL STEPS.

RAILINGS AND POSTS MAY BE EITHER ROUND OR SQUARE STEEL OF GOOD COMMERCIAL WELDABLE QUALITY OR ALUMINUM ALLOY 6061-T6 OR 6063-T6.

STEEL RAILINGS AND POSTS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO M111.

ALL JOINTS SHALL BE CONTINUOUS WELDED AND GROUND SMOOTH.

ALL RAILING SHALL HAVE A 1/4" WEEP HOLE NEAR ALL INTERSECTING RAILING CONNECTIONS.

SIDE ELEVATION

FRONT ELEVATION

## STAIRWAY STEP DETAILS

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**CONCRETE STAIRS**

DATE EFFECTIVE: 04/01/2015  
DATE PREPARED: 2/20/2015

**608.20E**

SHEET NO.  
1 OF 2

| QUANTITIES FOR CONCRETE STEPS |           |               |      |      |      |      |             |      |      |      |      |             |      |      |
|-------------------------------|-----------|---------------|------|------|------|------|-------------|------|------|------|------|-------------|------|------|
|                               |           | CONCRETE C.Y. |      |      |      |      | STEEL LB.   |      |      |      |      |             |      |      |
|                               |           | 10 1/2" TREAD |      |      |      |      | 1:1.5 SLOPE |      |      |      |      | 7" RISE     |      |      |
| W                             | NO. STEPS | 2             | 3    | 4    | 5    | 6    | 7           | 8    | 9    | 10   | 11   | 12          | 13   | 14   |
| 2'                            | CONC.     | 0.20          | 0.29 | 0.38 | 0.47 | 0.56 | 0.65        | 0.74 | 0.83 | 0.92 | 1.01 | 1.10        | 1.19 | 1.28 |
|                               | STEEL     | 10            | 13   | 16   | 20   | 24   | 28          | 30   | 34   | 38   | 42   | 46          | 48   | 52   |
| 3'                            | CONC.     | 0.27          | 0.39 | 0.51 | 0.63 | 0.75 | 0.88        | 1.00 | 1.12 | 1.24 | 1.36 | 1.48        | 1.60 | 1.73 |
|                               | STEEL     | 13            | 18   | 21   | 27   | 32   | 38          | 41   | 46   | 52   | 57   | 63          | 65   | 71   |
| 4'                            | CONC.     | 0.34          | 0.49 | 0.64 | 0.80 | 0.95 | 1.10        | 1.25 | 1.40 | 1.56 | 1.71 | 1.86        | 2.01 | 2.17 |
|                               | STEEL     | 17            | 23   | 27   | 34   | 41   | 48          | 52   | 59   | 66   | 73   | 80          | 83   | 90   |
| 5'                            | CONC.     | 0.41          | 0.59 | 0.78 | 0.96 | 1.14 | 1.33        | 1.51 | 1.69 | 1.88 | 2.06 | 2.24        | 2.42 | 2.61 |
|                               | STEEL     | 21            | 28   | 33   | 42   | 50   | 59          | 63   | 71   | 80   | 88   | 97          | 101  | 109  |
| 6'                            | CONC.     | 0.48          | 0.70 | 0.91 | 1.12 | 1.34 | 1.55        | 1.77 | 1.98 | 2.19 | 2.41 | 2.62        | 2.84 | 3.05 |
|                               | STEEL     | 24            | 33   | 39   | 49   | 59   | 69          | 74   | 84   | 94   | 104  | 114         | 118  | 128  |
|                               |           | 12" TREAD     |      |      |      |      | 1:2 SLOPE   |      |      |      |      | 6" RISE     |      |      |
| W                             | NO. STEPS | 2             | 3    | 4    | 5    | 6    | 7           | 8    | 9    | 10   | 11   | 12          | 13   | 14   |
| 2'                            | CONC.     | 0.18          | 0.26 | 0.33 | 0.41 | 0.49 | 0.56        | 0.64 | 0.72 | 0.80 | 0.87 | 0.95        | 1.03 | 1.10 |
|                               | STEEL     | 10            | 12   | 16   | 19   | 23   | 25          | 29   | 33   | 36   | 39   | 42          | 46   | 50   |
| 3'                            | CONC.     | 0.25          | 0.35 | 0.45 | 0.56 | 0.66 | 0.76        | 0.87 | 0.97 | 1.07 | 1.18 | 1.28        | 1.38 | 1.49 |
|                               | STEEL     | 13            | 16   | 21   | 26   | 32   | 34          | 39   | 45   | 50   | 53   | 58          | 63   | 68   |
| 4'                            | CONC.     | 0.31          | 0.44 | 0.57 | 0.70 | 0.83 | 0.96        | 1.09 | 1.22 | 1.35 | 1.48 | 1.61        | 1.74 | 1.87 |
|                               | STEEL     | 17            | 20   | 27   | 33   | 40   | 44          | 50   | 57   | 63   | 67   | 73          | 81   | 87   |
| 5'                            | CONC.     | 0.38          | 0.53 | 0.69 | 0.85 | 1.00 | 1.16        | 1.31 | 1.47 | 1.63 | 1.78 | 1.94        | 2.10 | 2.25 |
|                               | STEEL     | 21            | 25   | 33   | 41   | 49   | 53          | 61   | 69   | 77   | 82   | 89          | 98   | 105  |
| 6'                            | CONC.     | 0.44          | 0.62 | 0.81 | 0.99 | 1.17 | 1.36        | 1.54 | 1.72 | 1.90 | 2.09 | 2.27        | 2.45 | 2.64 |
|                               | STEEL     | 24            | 29   | 39   | 48   | 58   | 62          | 71   | 81   | 90   | 96   | 105         | 115  | 124  |
|                               |           | 14 1/4" TREAD |      |      |      |      | 1:3 SLOPE   |      |      |      |      | 4 3/4" RISE |      |      |
| W                             | NO. STEPS | 2             | 3    | 4    | 5    | 6    | 7           | 8    | 9    | 10   | 11   | 12          | 13   | 14   |
| 2'                            | CONC.     | 0.19          | 0.27 | 0.35 | 0.43 | 0.51 | 0.59        | 0.68 | 0.76 | 0.84 | 0.92 | 1.00        | 1.08 | 1.16 |
|                               | STEEL     | 10            | 14   | 18   | 21   | 25   | 29          | 33   | 37   | 41   | 43   | 47          | 51   | 55   |
| 3'                            | CONC.     | 0.26          | 0.37 | 0.48 | 0.59 | 0.70 | 0.80        | 0.91 | 1.02 | 1.13 | 1.24 | 1.35        | 1.46 | 1.56 |
|                               | STEEL     | 14            | 19   | 25   | 28   | 34   | 39          | 45   | 50   | 56   | 59   | 65          | 70   | 76   |
| 4'                            | CONC.     | 0.33          | 0.47 | 0.61 | 0.74 | 0.88 | 1.02        | 1.15 | 1.29 | 1.42 | 1.56 | 1.70        | 1.83 | 1.97 |
|                               | STEEL     | 18            | 25   | 32   | 36   | 43   | 50          | 57   | 64   | 71   | 75   | 82          | 89   | 96   |
| 5'                            | CONC.     | 0.40          | 0.57 | 0.73 | 0.90 | 1.06 | 1.22        | 1.39 | 1.55 | 1.72 | 1.88 | 2.05        | 2.21 | 2.38 |
|                               | STEEL     | 22            | 30   | 39   | 44   | 52   | 61          | 69   | 78   | 86   | 91   | 100         | 108  | 117  |
| 6'                            | CONC.     | 0.47          | 0.66 | 0.86 | 1.05 | 1.24 | 1.43        | 1.63 | 1.82 | 2.01 | 2.21 | 2.40        | 2.59 | 2.78 |
|                               | STEEL     | 25            | 35   | 45   | 51   | 61   | 71          | 81   | 91   | 101  | 107  | 117         | 127  | 137  |



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
ERIC E. SCHROETER  
NUMBER PE-28411  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

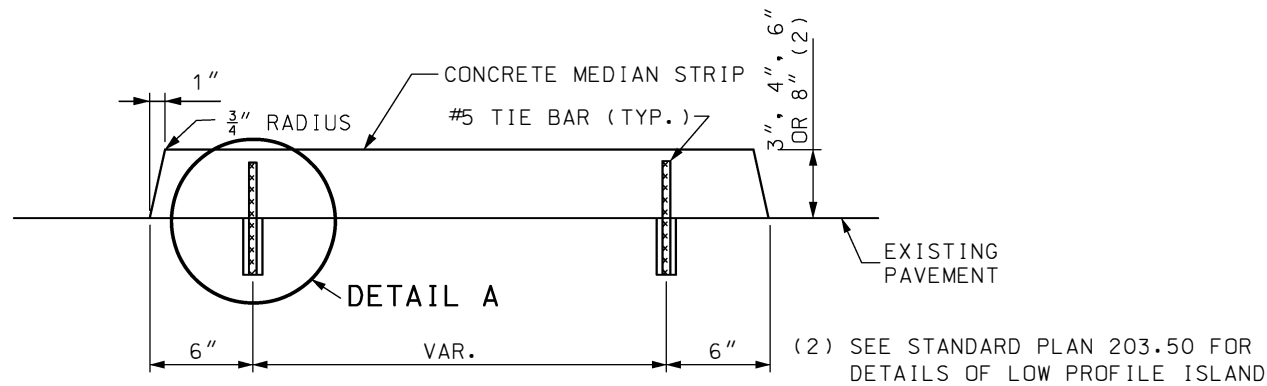
CONCRETE STAIRS

DATE EFFECTIVE: 04/01/2015  
DATE PREPARED: 2/20/2015

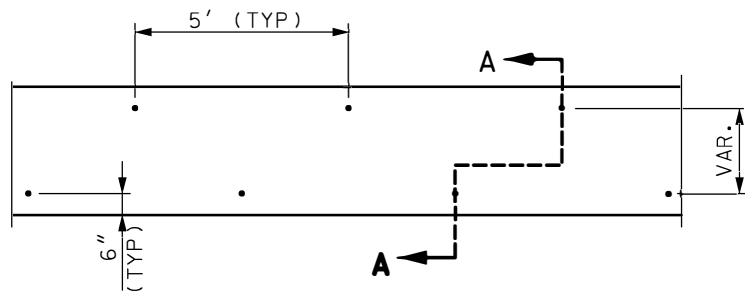
608.20E

SHEET NO.  
2 OF 2

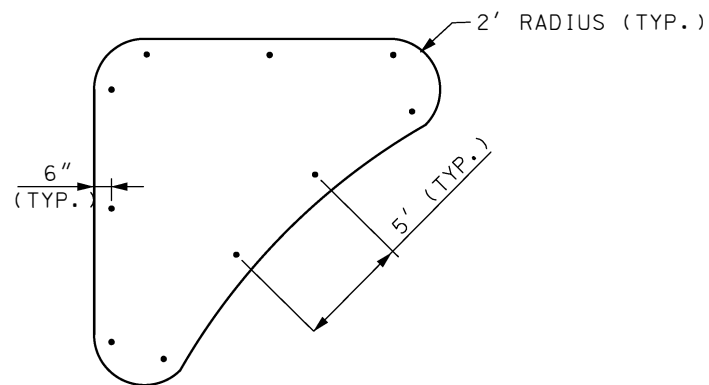
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



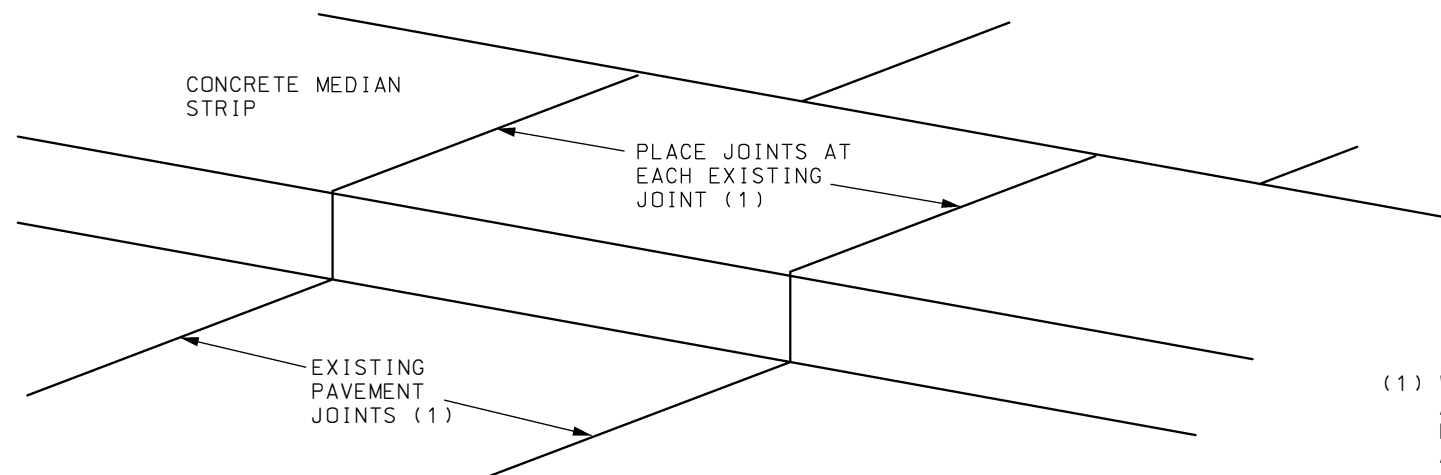
SECTION A-A  
CONCRETE MEDIAN STRIP



TIE BAR LOCATIONS FOR  
CONCRETE MEDIAN STRIP

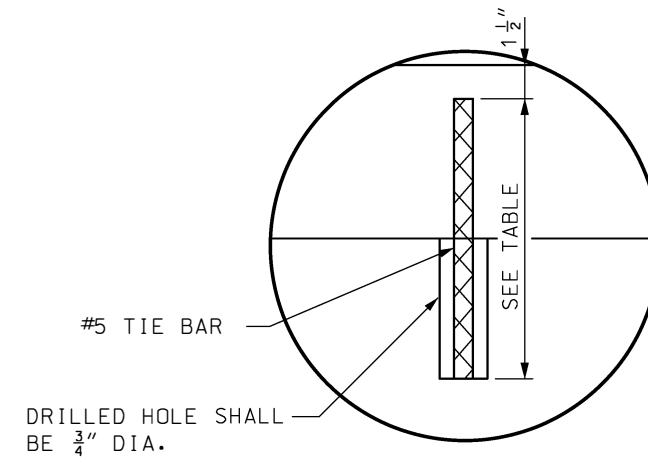


TIE BAR LOCATIONS FOR  
CONCRETE MEDIAN STRIP (ISLAND)



CONCRETE MEDIAN STRIP JOINT LOCATION

(1) WHEN THERE ARE NO VISIBLE JOINTS IN THE ADJACENT PAVEMENT, THE JOINT SPACING WILL BE EQUAL TO THE MEDIAN STRIP WIDTH, WITH A MINIMUM SPACING OF 10'.



DETAIL A

| MEDIAN HEIGHT | BAR LENGTH |
|---------------|------------|
| 3"            | 8"         |
| 4"            | 9"         |
| 6"            | 11"        |
| 8"            | 13"        |

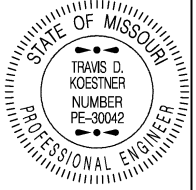
GENERAL NOTES:

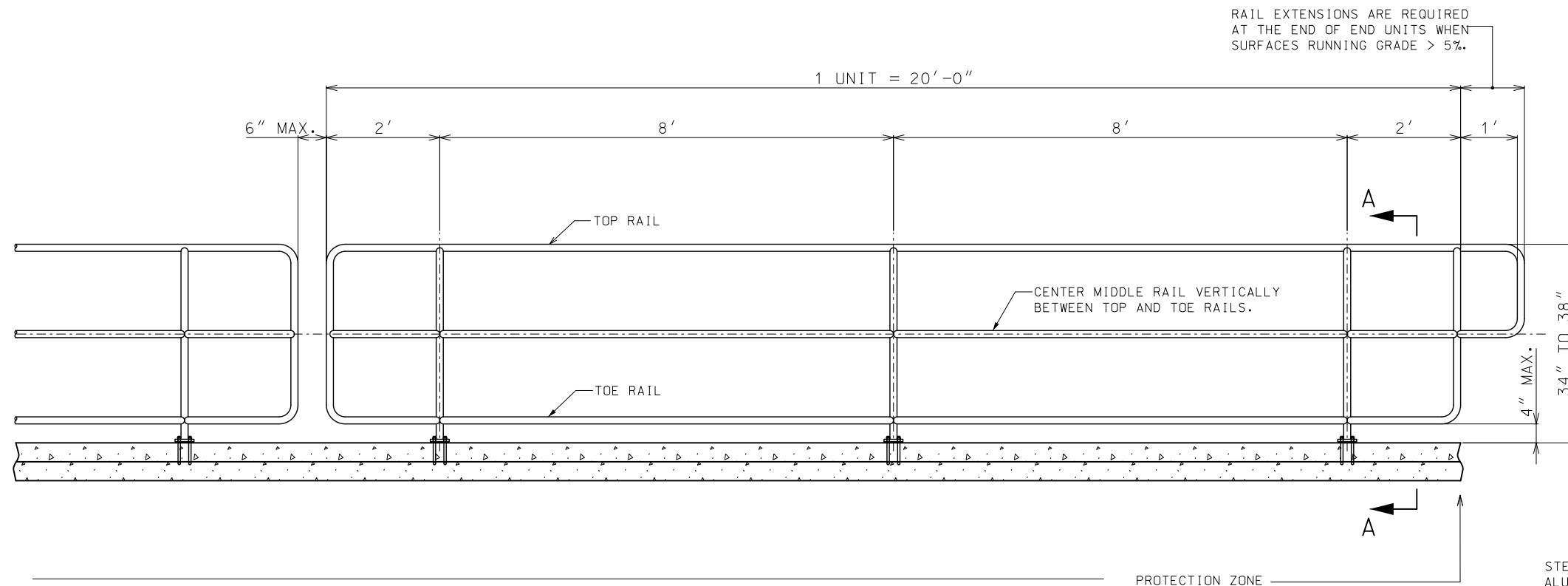
TIE BARS SHALL BE EPOXY COATED, DEFORMED REINFORCING BARS MEETING THE REQUIREMENTS OF SECTION 710 AND 1057.

BONDING FOR TIE BARS SHALL BE EPOXY OR POLYESTER BONDING AGENTS AS SPECIFIED IN SECTION 1039.

THE FACE OF THE MEDIAN MAY BE CONSTRUCTED WITHOUT BATTER WHEN CONSTRUCTED ON A RADIUS OF 6' OR LESS.

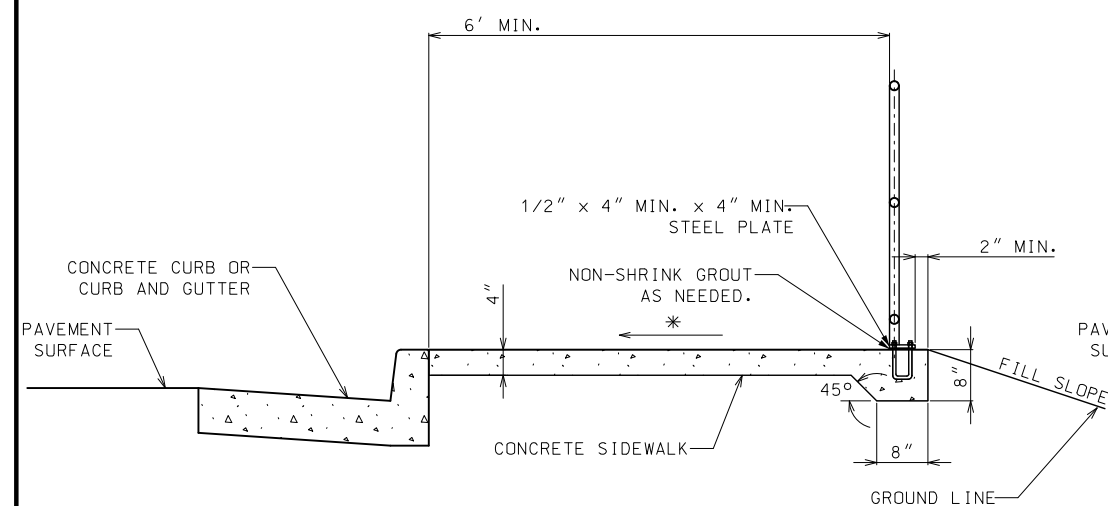
WHEN CONCRETE MEDIANS ARE CONSTRUCTED DIRECTLY BENEATH GUARDRAIL, THE MEDIAN HEIGHT WILL BE 4".

|                                                                                                                                                                                                                                  |                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                     |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <p><b>CONCRETE MEDIAN STRIP</b></p> |
| DATE EFFECTIVE: 10/01/2020<br>DATE PREPARED: 7/21/2020                                                                                                                                                                           | <p><b>608.30A</b></p>               |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                     |

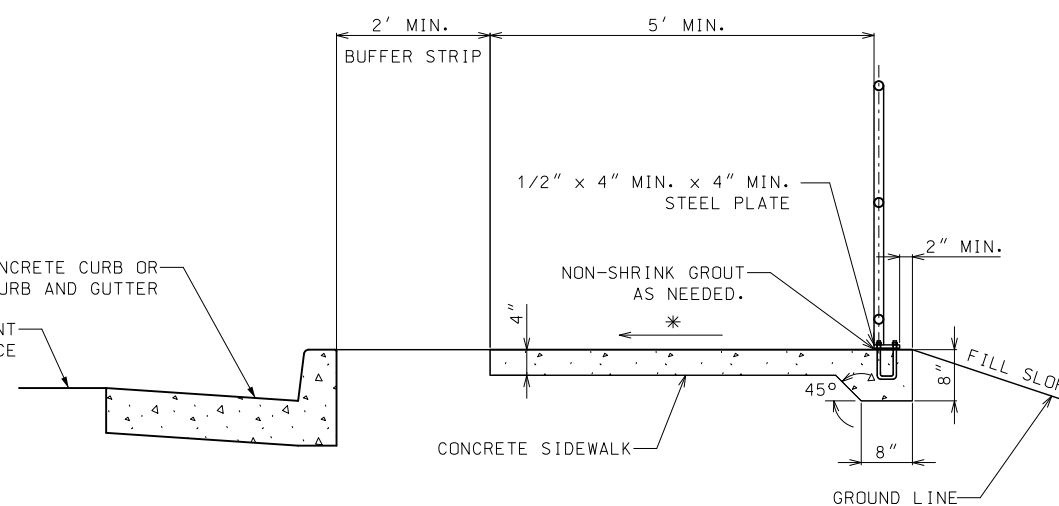


## SIDEWALK HANDRAILING WITHOUT BALUSTERS

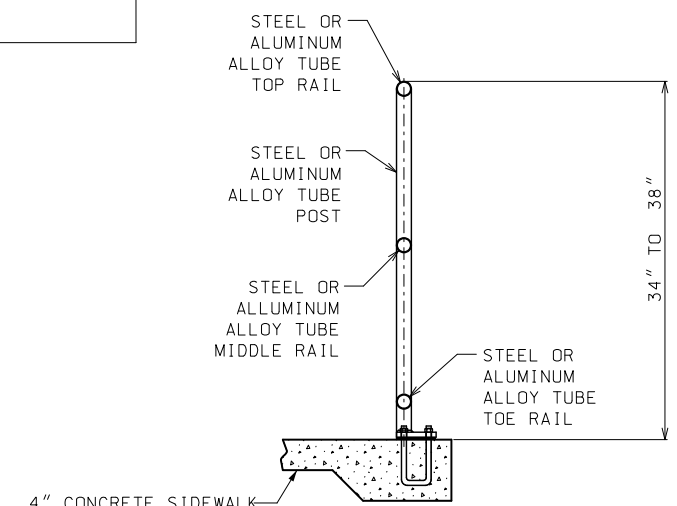
\* CROSS SLOPE: 1.0 % MIN. - 2.0 % MAX.



SIDEWALK WITHOUT BUFFER STRIP  
(SECTION A-A)



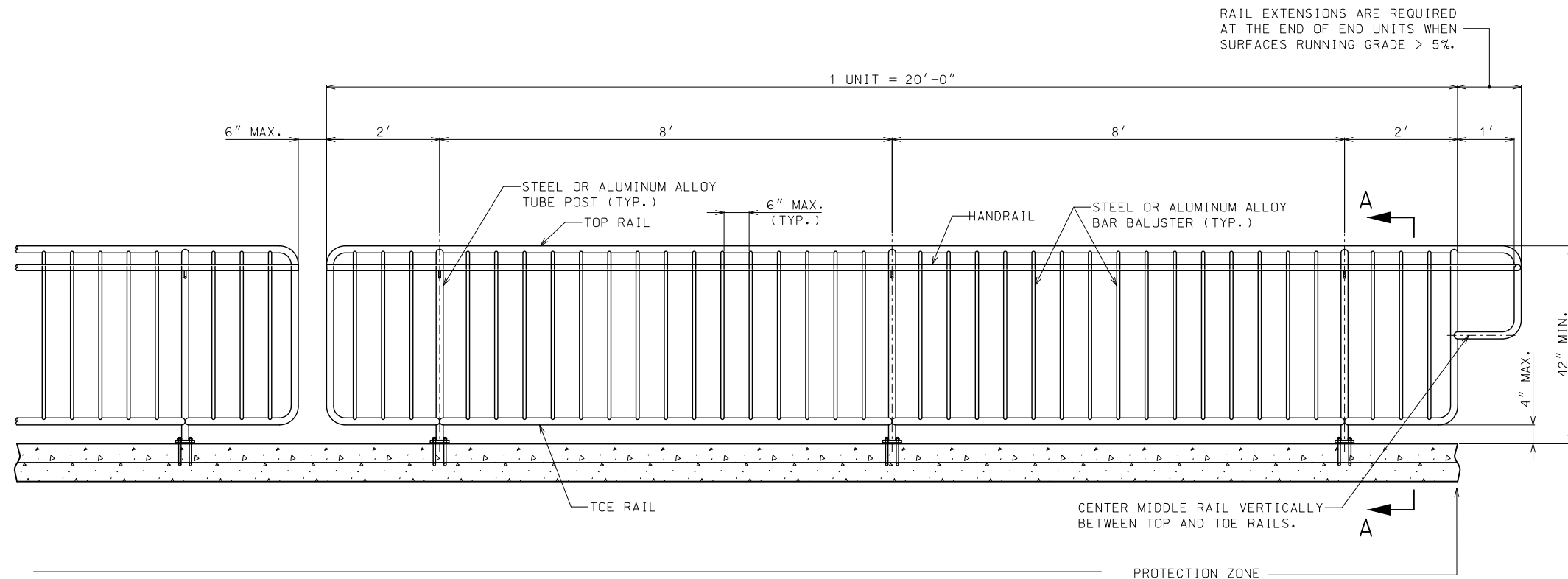
SIDEWALK WITH BUFFER STRIP  
(SECTION A-A)



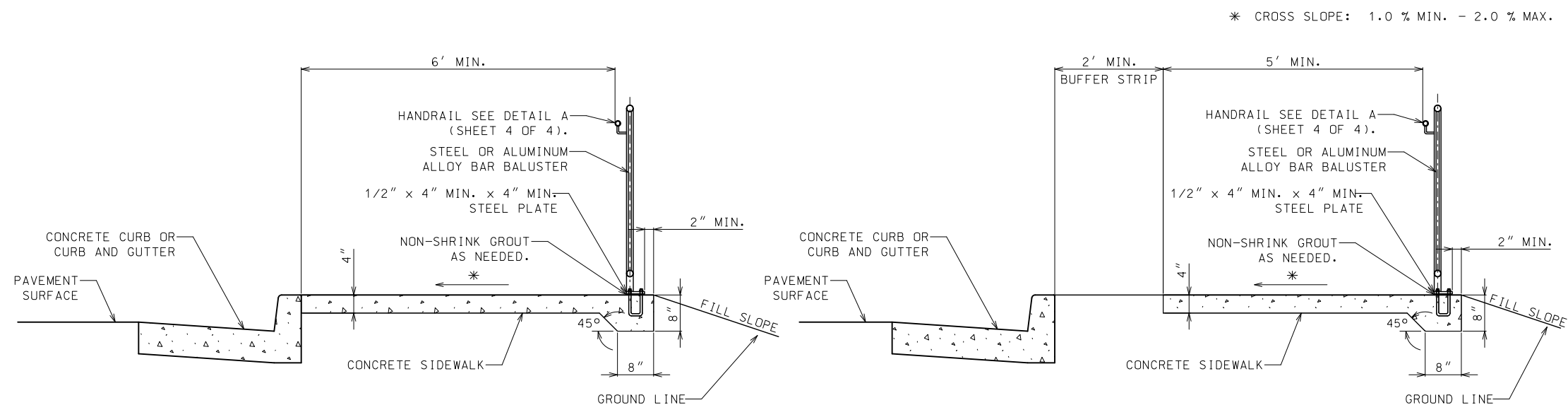
HANDRAILING

FOR GENERAL NOTES AND HANDRAILING REQUIREMENTS ON FILL SLOPES SEE SHEET 3 OF 4

|                                                                                                                                                                                                                                  |                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                    |
|                                                                                                                                             | <b>HANDRAILING</b> |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                          | <b>608.40A</b>     |
| SHEET NO.<br>1 OF 4                                                                                                                                                                                                              |                    |

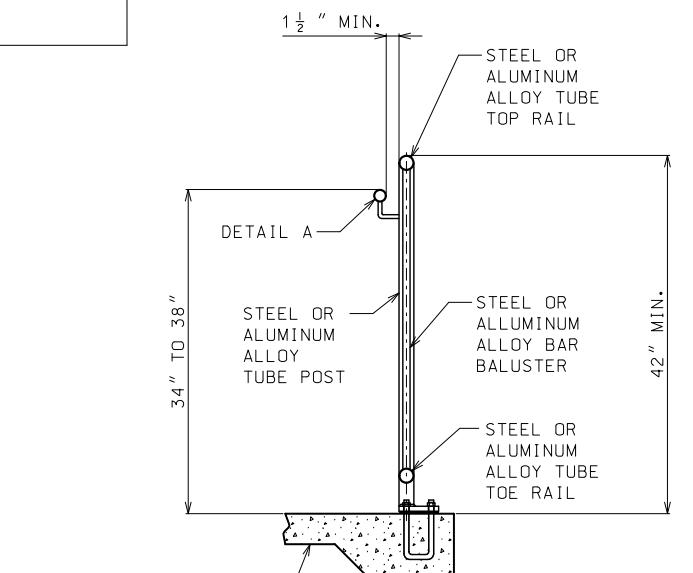


## SIDEWALK SAFETY RAIL WITH BALUSTERS AND HANDRAIL



SIDEWALK WITHOUT BUFFER STRIP  
(SECTION A-A)

SIDEWALK WITH BUFFER STRIP  
(SECTION A-A)

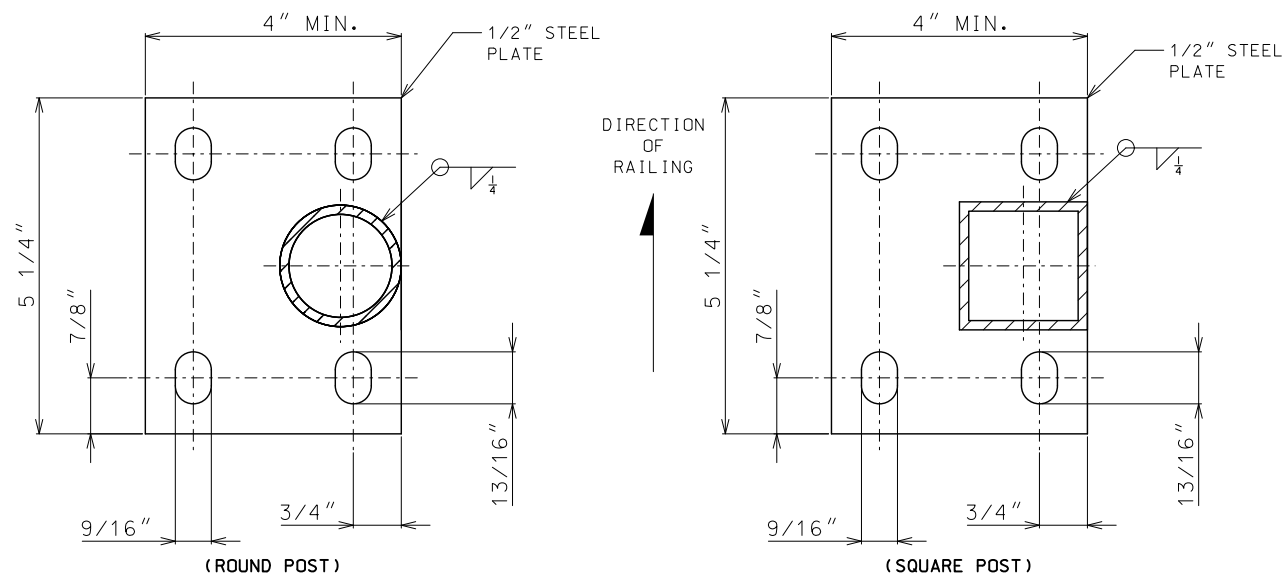


SAFETY RAIL WITH HANDRAIL

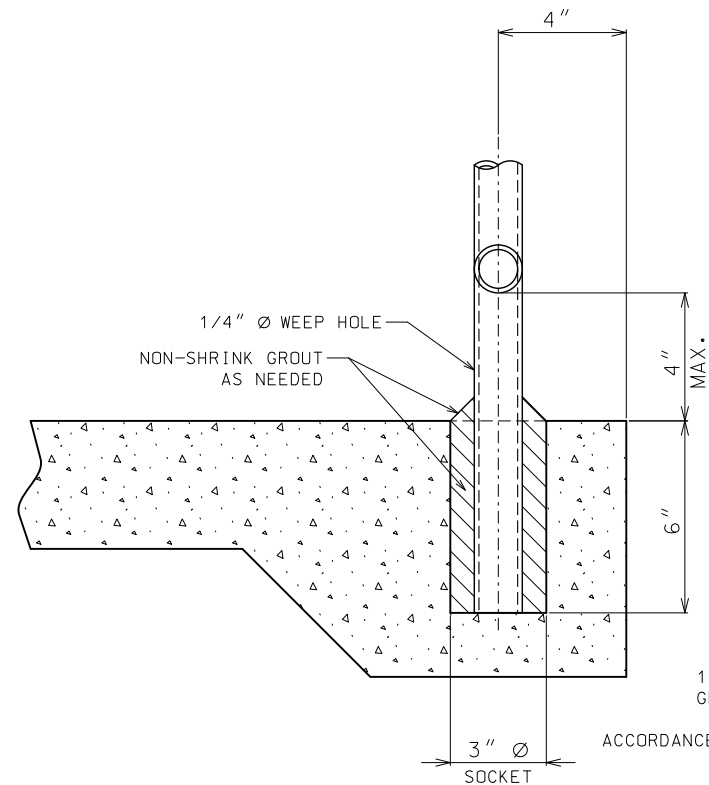
|                                                                                                                                                                                                                                  |                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                      |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <h2>HANDRAILING</h2> |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                          | <b>608.40A</b>       |
| SHEET NO. 2 OF 4                                                                                                                                                                                                                 |                      |

FOR GENERAL NOTES AND HANDRAIL REQUIREMENTS ON FILL SLOPES SEE SHEET 3 OF 4.

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



MOUNTING PLATE DETAIL  
(PLAN VIEW)



SOCKET MOUNTING DETAIL

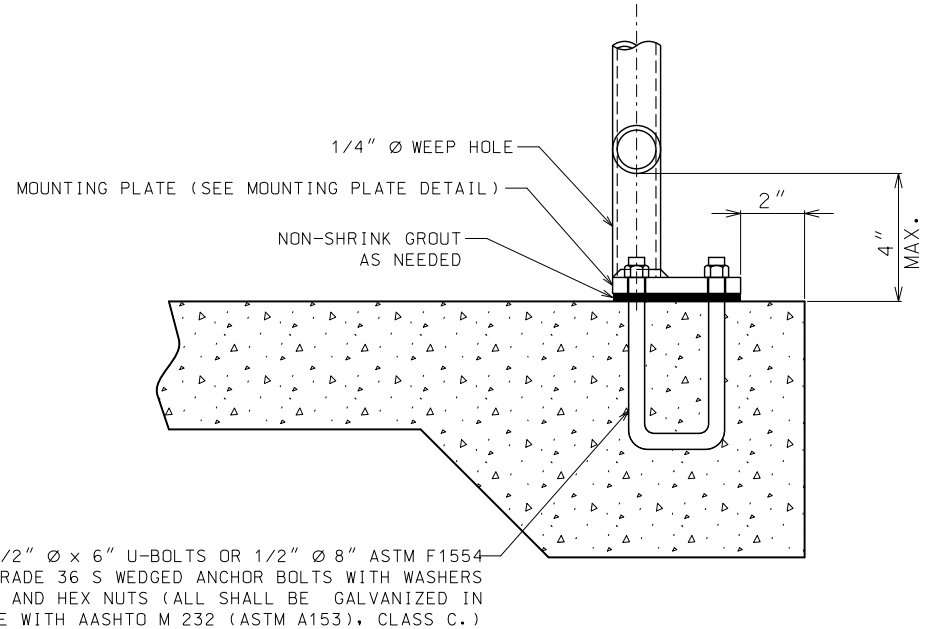


PLATE MOUNTING DETAIL

| HANDRAIL REQUIREMENTS |             |              |
|-----------------------|-------------|--------------|
| FILL SLOPE            | FILL HEIGHT | HANDRAIL     |
| (1V:3H) OR FLATTER    | _____       | NOT REQUIRED |
| (1V:3H) OR STEEPER    | ≥ 6 FT.     | REQUIRED     |
| (1V:2H) OR STEEPER    | ≥ 4 FT.     | REQUIRED     |
| (1V:1H) OR STEEPER    | ≥ 1 FT.     | REQUIRED     |

| RAILING AND POST SPECIFICATION |        |                   |                        |        |
|--------------------------------|--------|-------------------|------------------------|--------|
| DESCRIPTION                    | TYPE   | SIZE<br>( DIA. )  | WEIGHT<br>(LBS. / FT.) |        |
|                                |        |                   | ALUM.                  | STEEL  |
| RAILING & POST                 | ROUND  | 1 1/2"            | 0.940                  | 2.720  |
|                                | SQUARE | 2" X 2"           | 1.3094                 | 4.310  |
| BALUSTER                       | ROUND  | 1/2"              | 0.2312                 | 0.668  |
|                                | RECT.  | 3/8" X 1/2" STL.  | _____                  | 0.6375 |
|                                | SQUARE | 1/2" X 1/2" ALUM. | 0.2944                 | _____  |

GENERAL NOTES:

RAILINGS AND POSTS MAY BE EITHER ROUND OR SQUARE STEEL OF GOOD COMMERCIAL WELDABLE QUALITY OR ALUMINUM ALLOY 6061-T6 OR 6063-T6.

STEEL RAILINGS AND POSTS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO M111.

ALL JOINTS SHALL BE CONTINUOUS WELDED AND GROUND SMOOTH.

METAL SAFETY RAIL MUST BE COMPLIANT WITH THE "AMERICAN'S WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG)". EXCEPTIONS MUST BE APPROVED BY THE ENGINEER. ALL OTHER AREAS OF NON-COMPLIANCE SHALL BE REMOVED AND CORRECTED AT THE CONTRACTOR'S EXPENSE.

ALL POSTS SHALL HAVE A 1/4" WEEP HOLE IMMEDIATELY ABOVE THE MOUNTING PLATE.

WHEN INSTALLED THE POSTS SHALL BE PLUMB AND RAILINGS SHALL MATCH THE SLOPE OF THE SIDEWALK.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER  
PE-30042  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

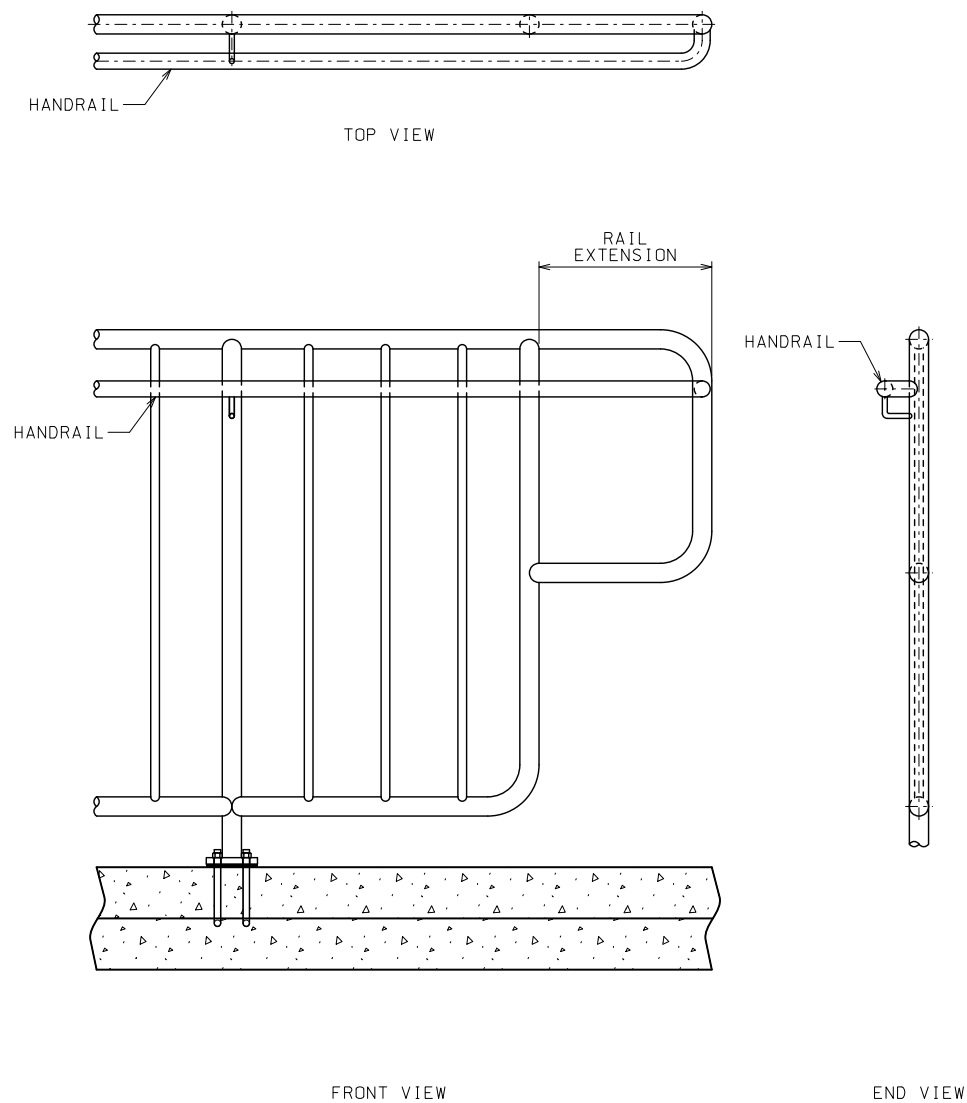
HANDRAILING

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

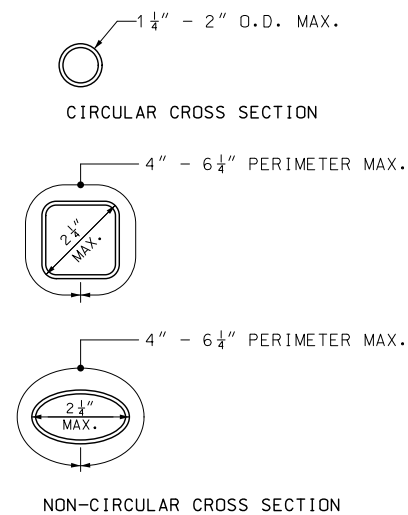
SHEET NO.  
3 OF 4

608.40A

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



HANDRAIL AND EXTENSION CONNECTION



HANDRAIL GRIPPING SURFACES

HANDRAIL NOTES:

HANDRAILS SHALL BE STEEL OF GOOD COMMERCIAL WELDABLE QUALITY OR ALUMINUM ALLOY 6061-T6 OR 6063-T6.

HANDRAILS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO M111.

HANDRAILS SHALL BE AT A CONSISTENT HEIGHT ABOVE WALKING SURFACES.

HANDRAIL GRIPPING SURFACES SHALL BE CONTINUOUS ALONG THEIR LENGTH AND SHALL NOT BE OBSTRUCTED ALONG THEIR TOPS OR SIDES.

THE BOTTOMS OF HANDRAIL GRIPPING SURFACES SHALL NOT BE OBSTRUCTED FOR MORE THAN 20 PERCENT OF THEIR LENGTH.

WHERE HANDRAILS ARE PROVIDED ALONG WALKING SURFACES WITH SLOPES NOT STEEPER THAN 1:20, THE BOTTOMS OF HANDRAIL GRIPPING SURFACES SHALL BE PERMITTED TO BE OBSTRUCTED ALONG THEIR ENTIRE LENGTH WHERE THEY ARE INTEGRAL TO CRASH RAILS OR BUMPER GUARDS.

THE DISTANCE BETWEEN HORIZONTAL PROJECTIONS AND THE BOTTOM OF THE GRIPPING SURFACE SHALL BE PERMITTED TO BE REDUCED BY  $\frac{1}{8}$ " FOR EACH  $\frac{1}{2}$ " OF ADDITIONAL HANDRAIL PERIMETER DIMENSION THAT EXCEEDS 4".

HANDRAIL SURFACES AND ANY SURFACES ADJACENT TO THEM SHALL BE FREE OF SHARP OR ABRASIVE ELEMENTS AND SHALL HAVE ROUNDED EDGES.

HANDRAILS SHALL NOT ROTATE WITHIN THEIR FITTINGS.

DETAIL A - HANDRAIL



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

TRAVIS D. KOESTNER

NUMBER PE-30042

PROFESSIONAL ENGINEER

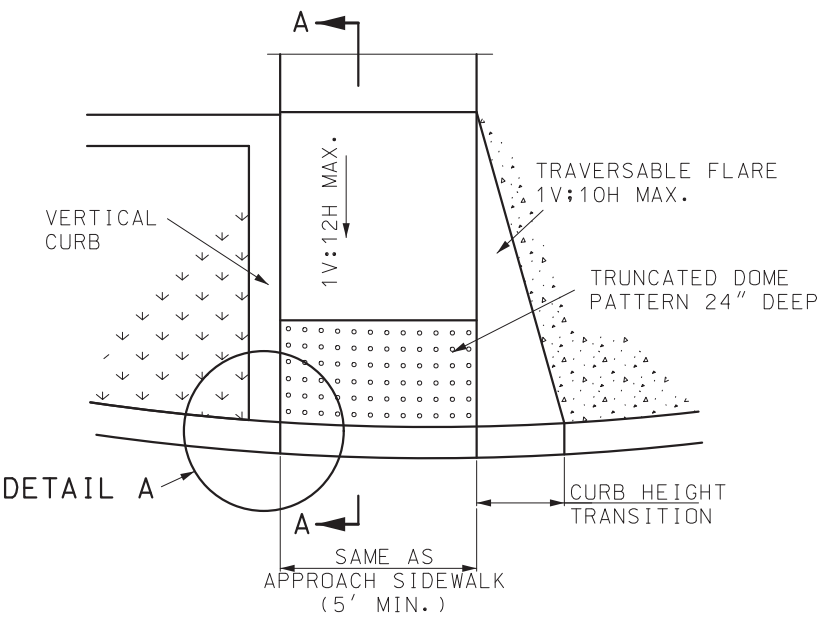
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

HANDRAILING

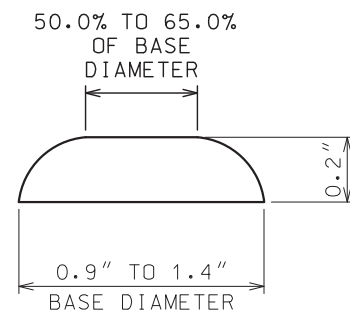
DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

SHEET NO.  
608.40A  
4 OF 4

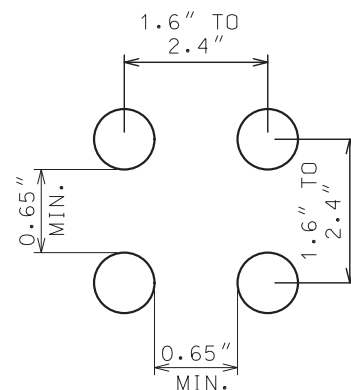




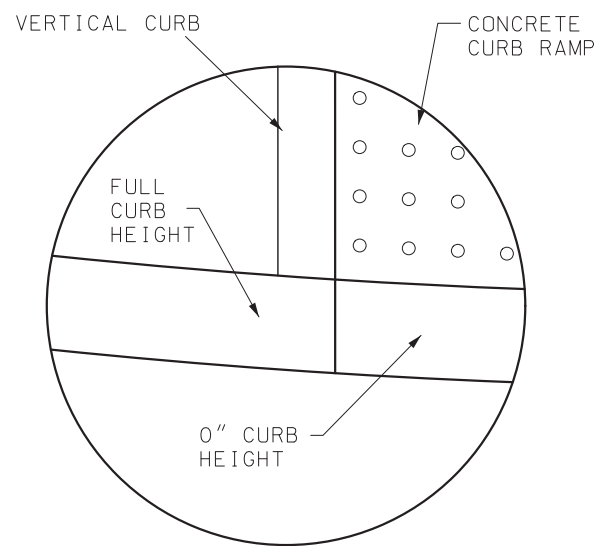
CURB RAMP DETAIL



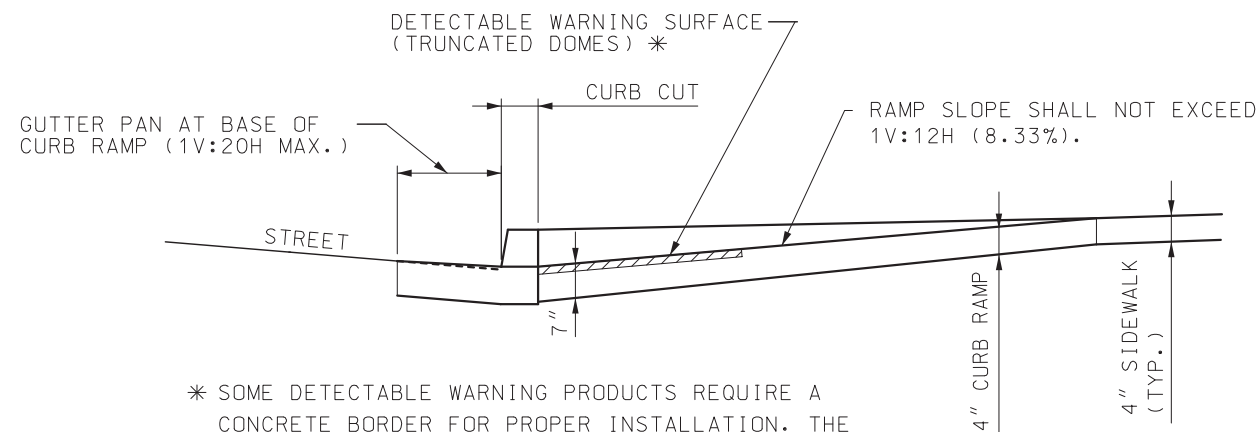
TRUNCATED DOMES CROSS SECTION



TRUNCATED DOMES SPACING



DETAIL A



\* SOME DETECTABLE WARNING PRODUCTS REQUIRE A CONCRETE BORDER FOR PROPER INSTALLATION. THE CONCRETE BORDER SHALL NOT EXCEED 2" PER SIDE.

SECTION A-A

#### GENERAL NOTES:

ALL AREAS OF THE PEDESTRIAN ACCESS ROUTE MUST BE COMPLIANT WITH THE AMERICANS WITH DISABILITIES ACT - GUIDELINES FOR ACCESSIBLE PUBLIC RIGHTS OF WAY". EXCEPTIONS MUST BE APPROVED BY THE ENGINEER. ALL OTHER AREAS OF NON-COMPLIANCE SHALL BE REMOVED AND CORRECTED AT THE CONTRACTOR'S EXPENSE.

THE SURFACES OF PEDESTRIAN ACCESS ROUTES AND ELEMENTS, AND SPACES REQUIRED TO CONNECT TO PEDESTRIAN ACCESS ROUTES, SHALL BE FIRM, STABLE, SLIP RESISTANT, AND SHALL NOT POND WATER.

SIDEWALK, RAMP AND LANDING CROSS SLOPES SHALL BE 1.00% TO FACILITATE DRAINAGE (2.00% MAX.).

THE CROSS SLOPE OF THE CONTINUOUS PEDESTRIAN ACCESS ROUTE THROUGH ENTRANCES, ALLEYS, AND SIDE ROAD CONNECTIONS WITH STOP OR YIELD CONTROL SHALL BE 1.00% TO FACILITATE DRAINAGE (2.00% MAX.).

WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN PEDESTRIAN STREET CROSSINGS WITHOUT YIELD OR STOP CONTROL, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE 5.00% MAXIMUM.

WHERE PEDESTRIAN ACCESS ROUTES ARE CONTAINED WITHIN MIDBLOCK PEDESTRIAN STREET CROSSINGS, THE CROSS SLOPE OF THE PEDESTRIAN ACCESS ROUTE SHALL BE PERMITTED TO EQUAL THE STREET OR HIGHWAY GRADE.

30"x 48" CLEAR SPACE SHALL BE PROVIDED CENTERED ON THE PEDESTRIAN PUSH BUTTON.

BEYOND THE BOTTOM GRADE BREAK OF A CURB RAMP, A CLEAR SPACE 4' MINIMUM BY 4' MINIMUM SHALL BE PROVIDED WITHIN THE WIDTH OF THE PEDESTRIAN STREET CROSSING AND WHOLLY OUTSIDE THE PARALLEL VEHICLE TRAVEL LANE.

SIDE FLARES OF CURB RAMPS, IN THE PATH OF PEDESTRIAN TRAVEL (TRAVERSABLE), SHALL NOT EXCEED A SLOPE OF 1V:10H. SIDE FLARES OUTSIDE THE PEDESTRIAN PATH (NONTRAVERSABLE) MAY BE VERTICAL.

TRANSITION FROM SIDEWALK OR CURB RAMP TO GUTTER TO ROADWAY SHALL BE FLUSH.

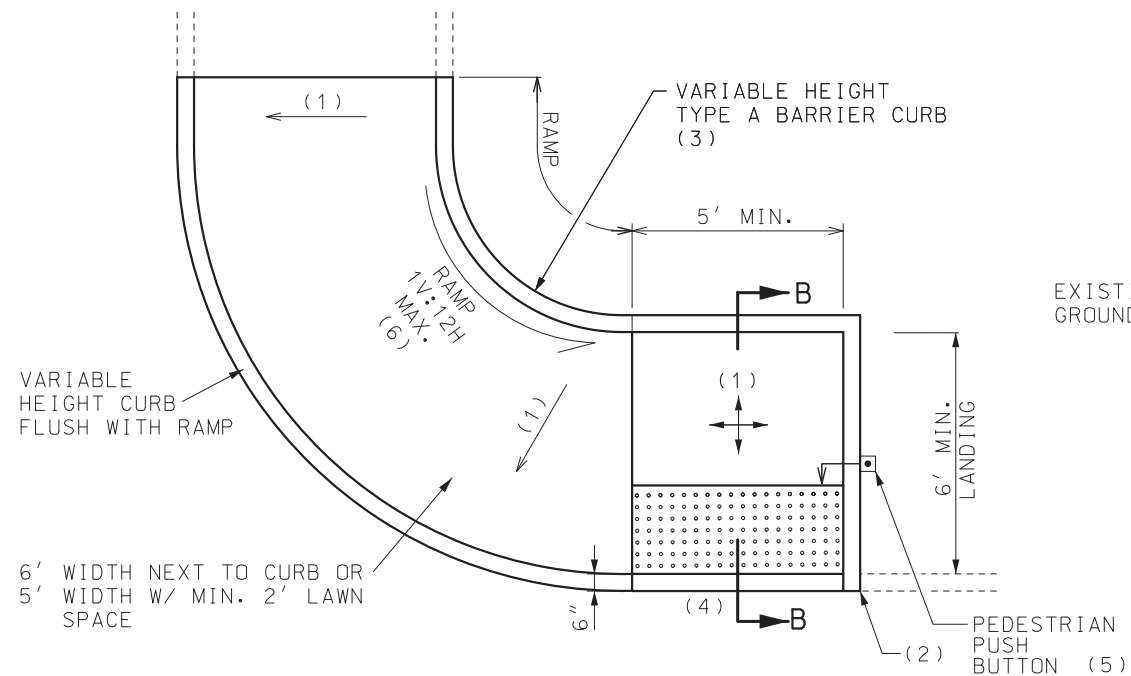
DETECTABLE WARNING SURFACES (TRUNCATED DOMES) SHALL BE PREFORMED AND INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS. STAMPED CONCRETE WILL NOT BE ACCEPTED.

THE DETECTABLE WARNING SURFACE SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT. TRUNCATED DOMES SHALL SPAN THE FULL WIDTH OF THE RAMP OR LANDING 24" DEEP.

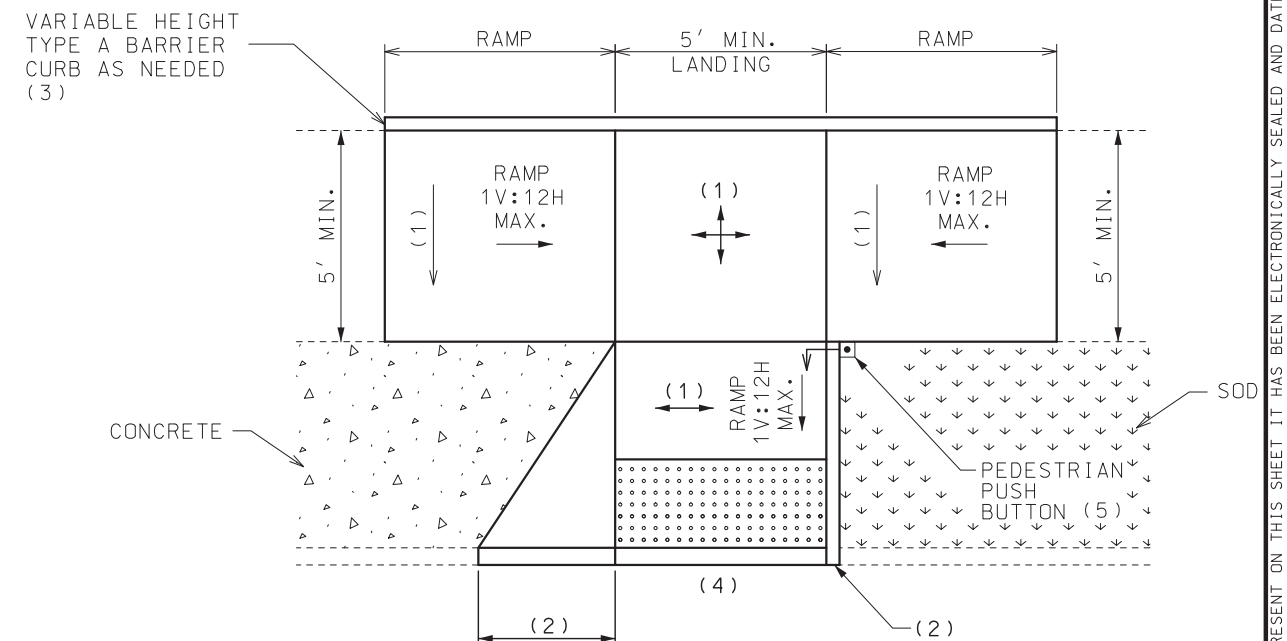
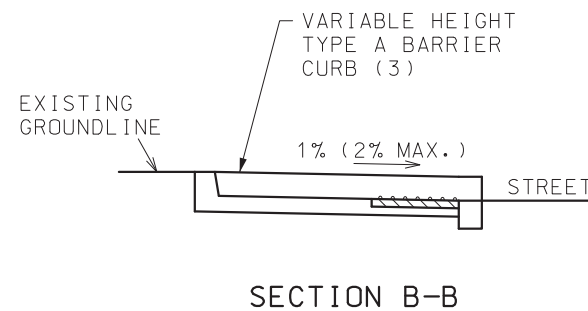
DETECTABLE WARNING SURFACES SHALL BE ALIGNED PERPENDICULAR OR RADIAL TO THE BREAK BETWEEN THE RAMP, LANDING OR BLENDED TRANSITION, AND THE STREET.

WHERE THE BOTTOM GRADE BREAK OF A CURB RAMP IS LESS THAN 5' FROM THE BACK OF CURB, DETECTABLE WARNINGS SHALL BE LOCATED ON THE RAMP SURFACE AT THE BACK OF THE CURB. WHERE THE GRADE BREAK IS GREATER THAN 5' FROM THE BACK OF CURB, THE DETECTABLE WARNING SHALL BE LOCATED ON THE LOWER LANDING.

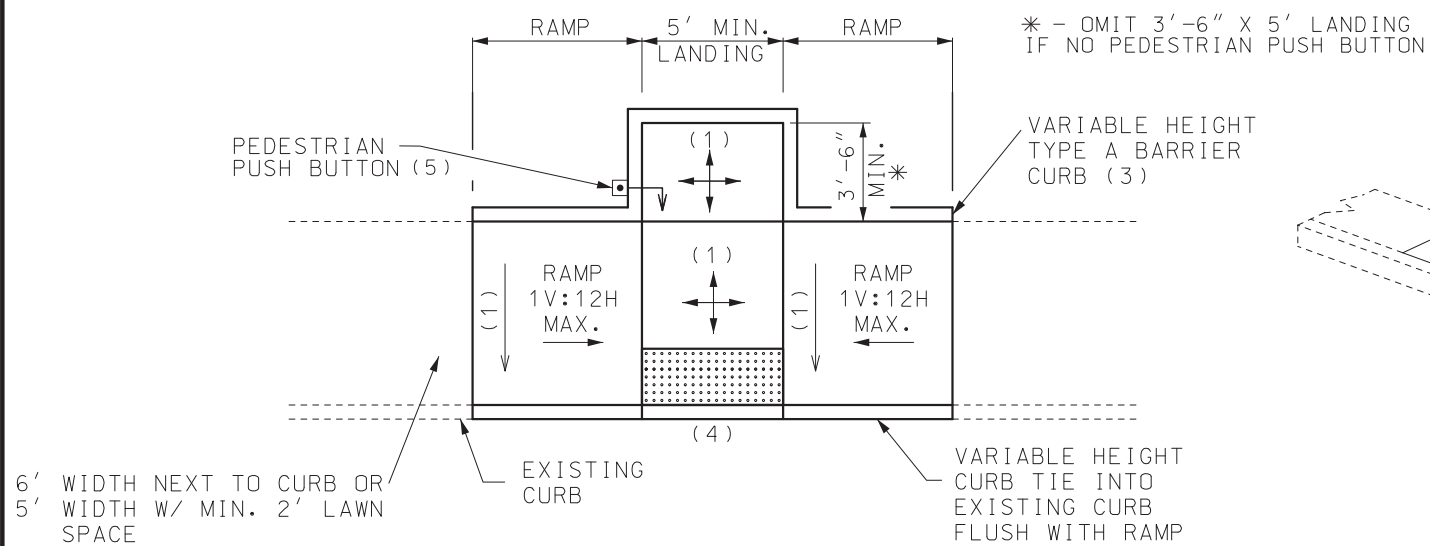
|                                                                                                                                              |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                   |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                   |
|                                                         | <b>CURB RAMPS</b> |
| DATE EFFECTIVE: 01/01/2023<br>DATE PREPARED: 10/6/2022                                                                                       | <b>608.50A</b>    |
| SHEET NO.<br>1 of 4                                                                                                                          |                   |



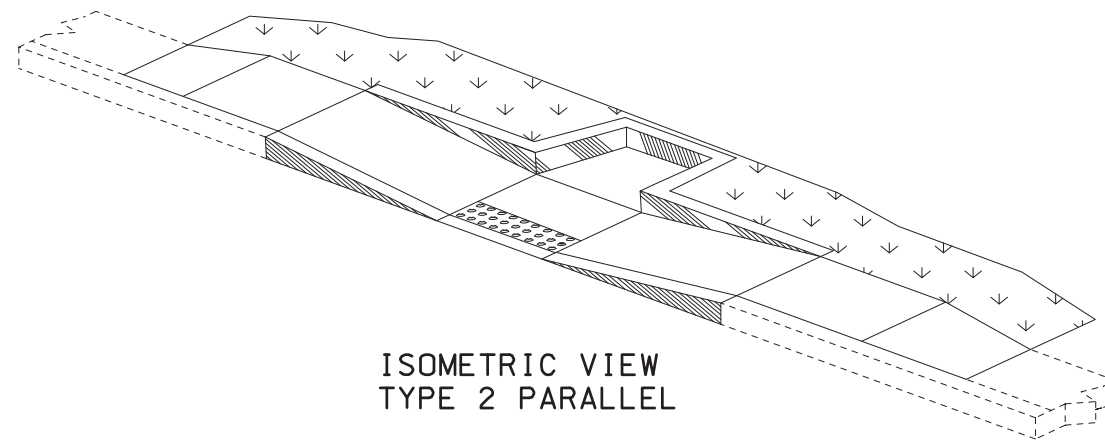
TYPE 1 PARALLEL



COMPOUND PERPENDICULAR

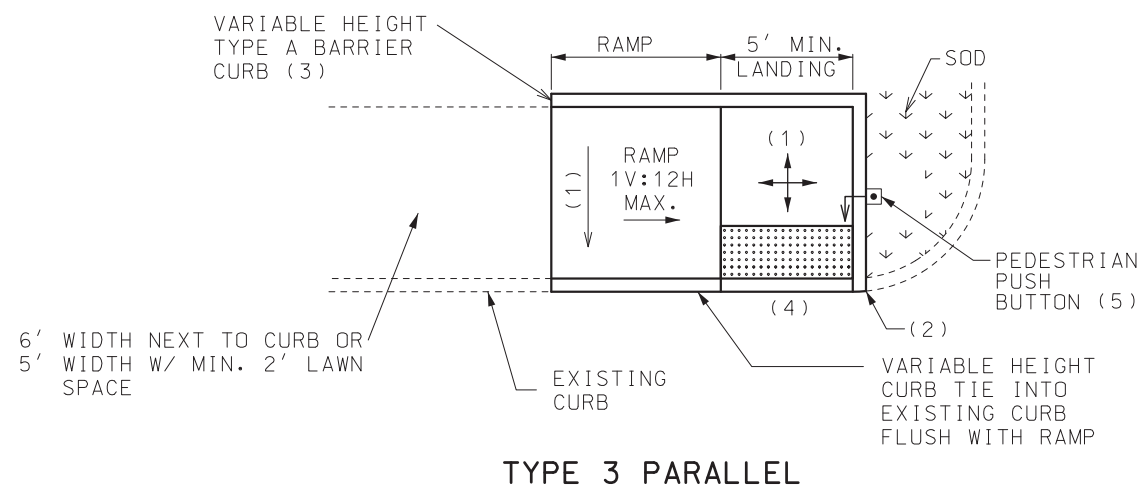


TYPE 2 PARALLEL

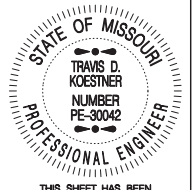


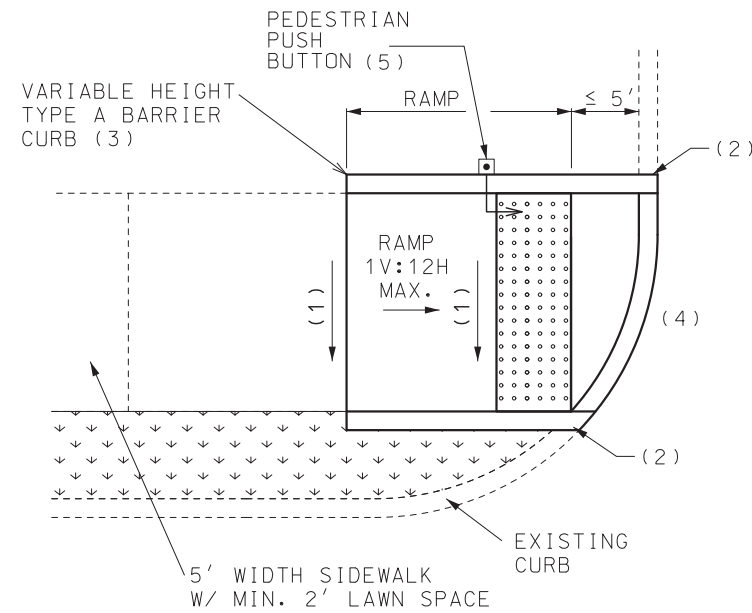
GENERAL NOTES:

- (1) 1.0% (2.0% MAX.) CROSS SLOPE OR ROAD GRADE EXCEPTION.
- (2) VARIABLE HEIGHT VERTICAL CURB. IF TRAVERSABLE USE A MAXIMUM 1V:10H FLARE MEASURED PARALLEL TO THE CURB LINE.
- (3) HEIGHT VARIES TO MEET EXISTING GROUND.
- (4) THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE FOOT OF CURB RAMP RUNS, BLENDED TRANSITIONS, AND TURNING SPACES SHALL BE 5% MAXIMUM.
- (5) THE FACE OF PEDESTRIAN PUSH BUTTONS SHALL BE OFFSET 0" FOR FRONT APPROACH AND 10" MAX. FOR SIDE APPROACH TO THE CURB FACE.
- (6) ENSURE THAT THE INSIDE EDGE OF CURVED RAMPS MAINTAIN AN 8.3% (1V:12H) MAXIMUM SLOPE.

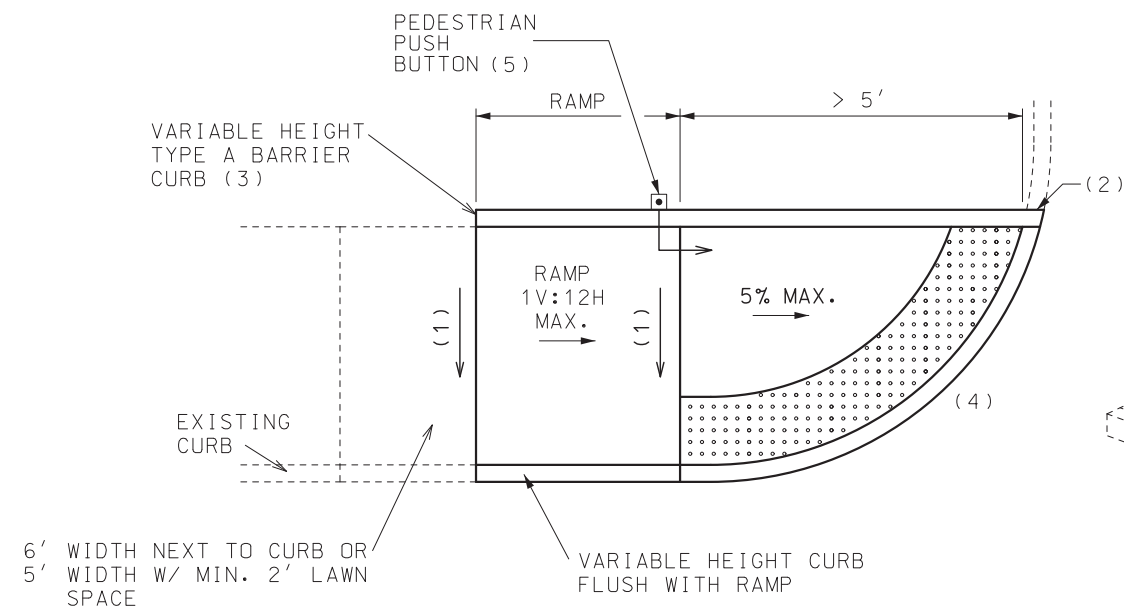


TYPE 3 PARALLEL

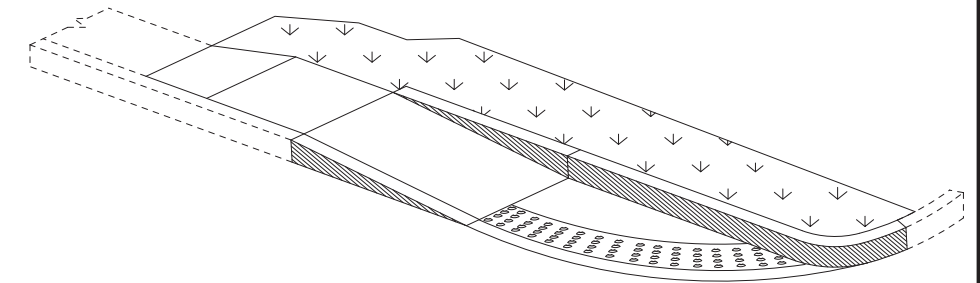
|                                                                                                                                                                                                                                                         |                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>           |                                                |
|  <p>STATE OF MISSOURI<br/>TRAVIS D. KOESTNER<br/>NUMBER PE-30042<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>CURB RAMPS</b></p>                       |
| <p>DATE EFFECTIVE: 01/01/2023</p> <p>DATE PREPARED: 10/6/2022</p>                                                                                                                                                                                       | <p>SHEET NO.<br/><b>608.50A</b><br/>2 of 4</p> |



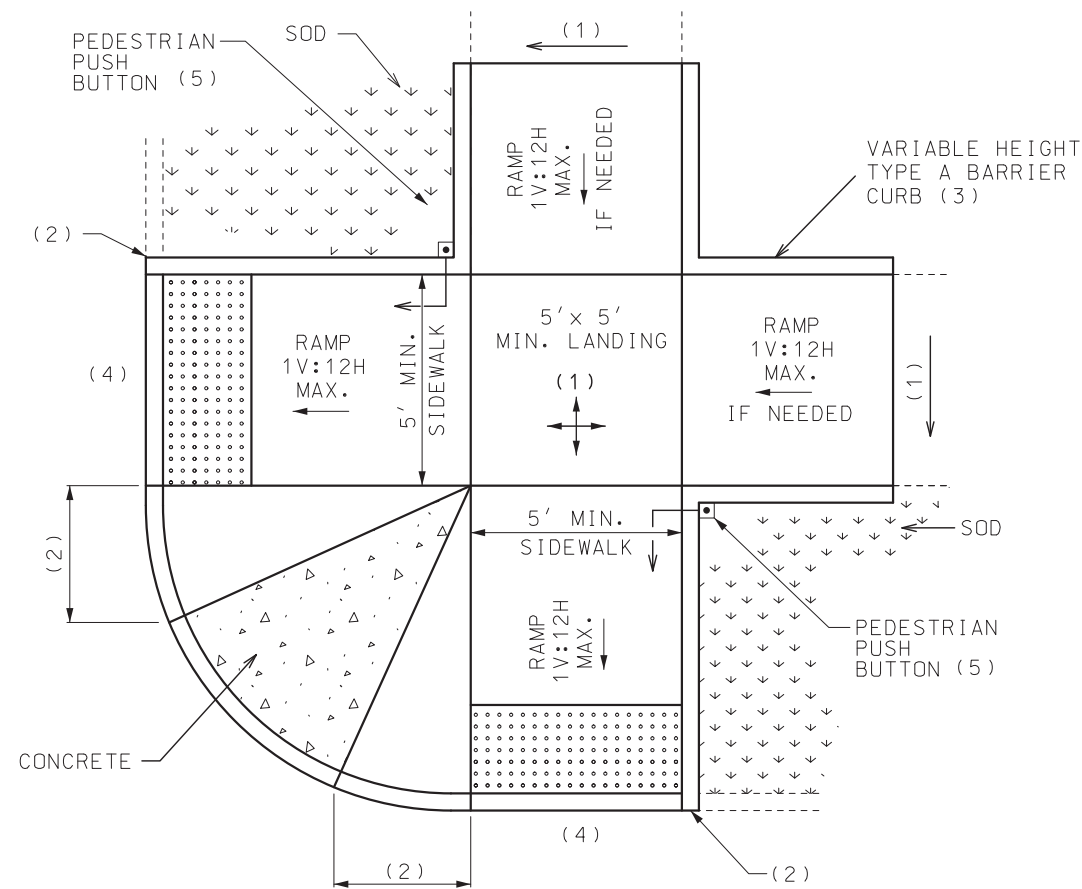
SMALL RADIUS PERPENDICULAR



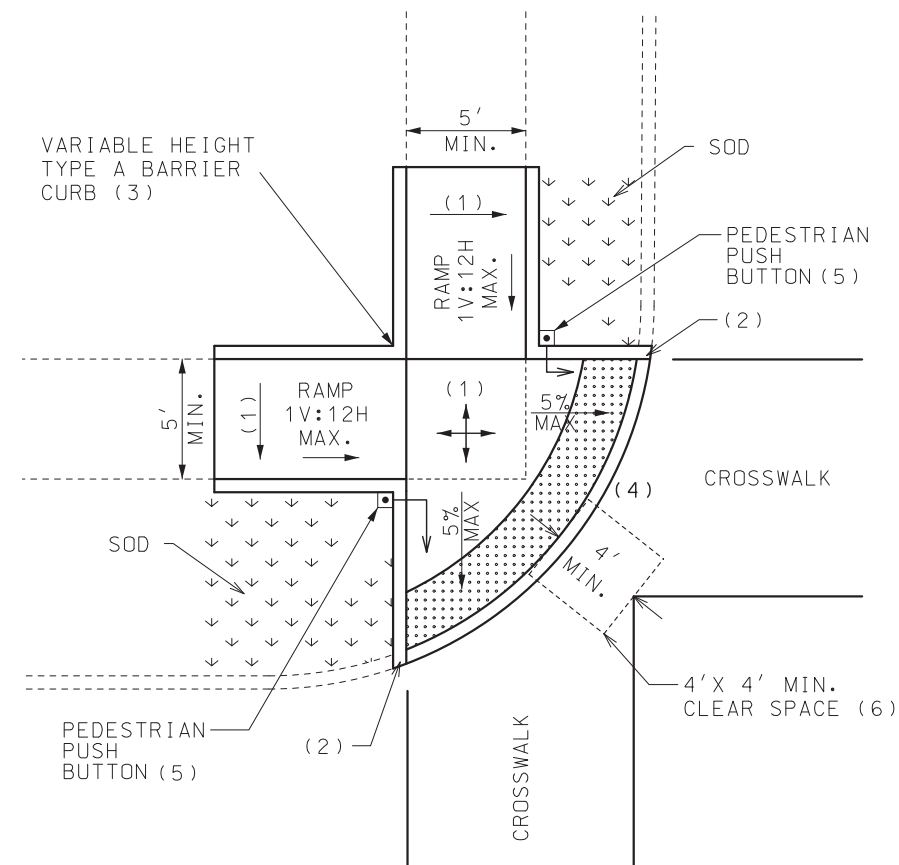
LARGE RADIUS PERPENDICULAR



ISOMETRIC VIEW  
LARGE RADIUS PERPENDICULAR



DUAL PERPENDICULAR

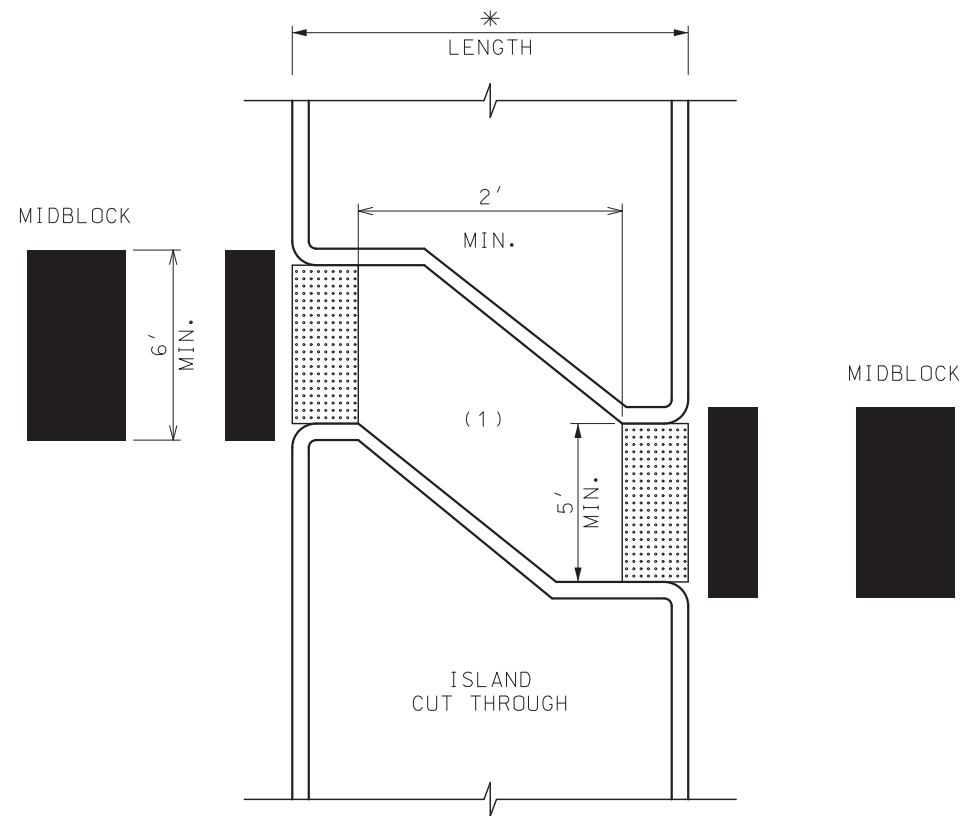


BLENDED TRANSITION

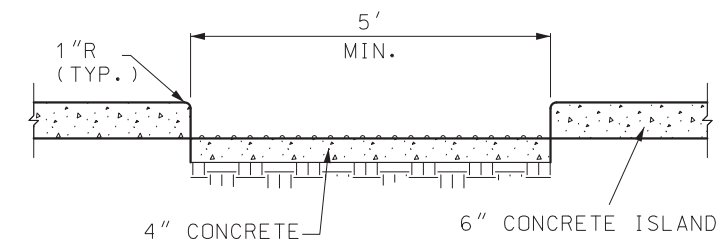
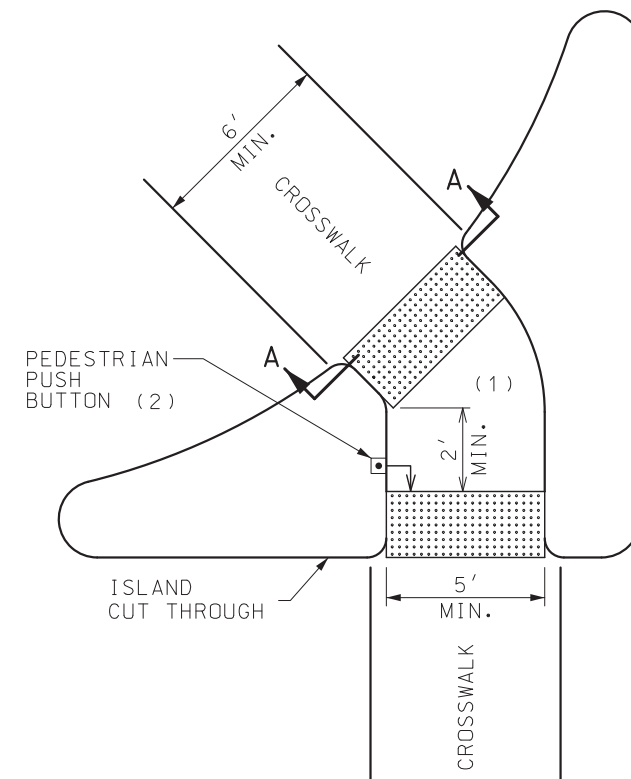
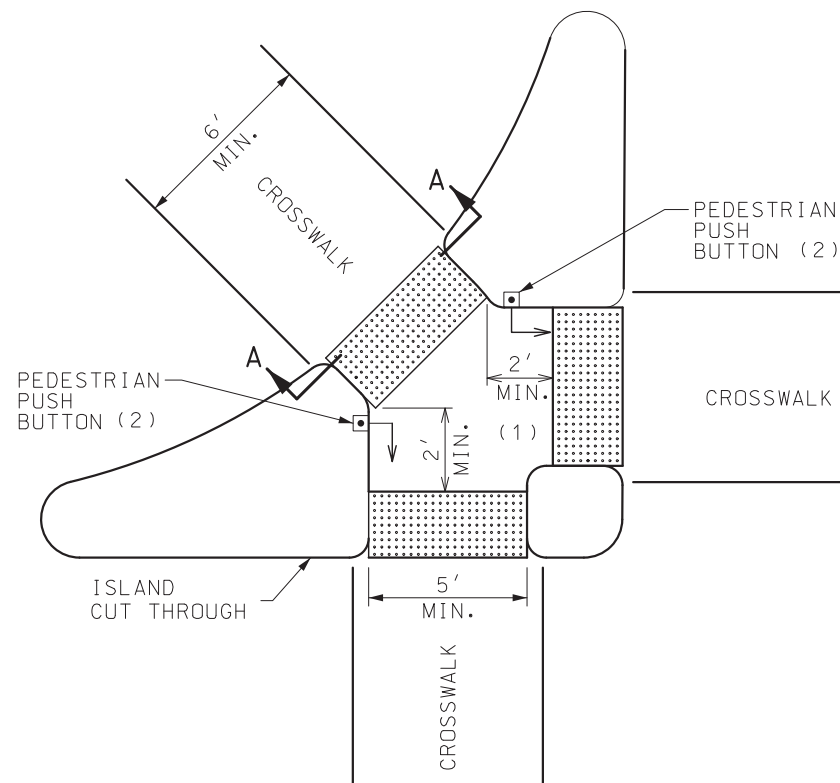
GENERAL NOTES:

- (1) 1.0% MINIMUM, 2.0% MAXIMUM CROSS SLOPE.
- (2) VARIABLE HEIGHT VERTICAL CURB. IF TRAVERSABLE USE A MAX. 1V:10H FLARE MEASURED PARALLEL TO THE CURB LINE.
- (3) HEIGHT VARIES TO MEET EXISTING GROUND.
- (4) THE COUNTER SLOPE OF THE GUTTER OR STREET AT THE FOOT OF CURB RAMP RUNS, BLENDED TRANSITIONS, AND TURNING SPACES SHALL BE 5% MAXIMUM.
- (5) THE FACE OF PEDESTRIAN PUSH BUTTONS SHALL BE OFFSET 0" FOR FRONT APPROACH AND 10" MAX. FOR SIDE APPROACH TO THE CURB FACE.
- (6) BEYOND THE BOTTOM GRADE BREAK, A CLEAR SPACE 4'X 4' MINIMUM SHALL BE PROVIDED WITHIN THE WIDTH OF THE PEDESTRIAN STREET CROSSING AND WHOLLY OUTSIDE THE PARALLEL VEHICLE TRAVEL LANE.

|                                                                                                                                                                                                                                                                                                                                                                                     |                                     |                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                                                                                                    |                                     |                            |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> </div> <div style="text-align: center;"> <h2 style="margin: 0;">CURB RAMPS</h2> </div> </div> |                                     |                            |
| DATE EFFECTIVE: 01/01/2023<br>DATE PREPARED: 10/6/2022                                                                                                                                                                                                                                                                                                                              | <h1 style="margin: 0;">608.50A</h1> | SHEET NO.<br><b>3 of 4</b> |



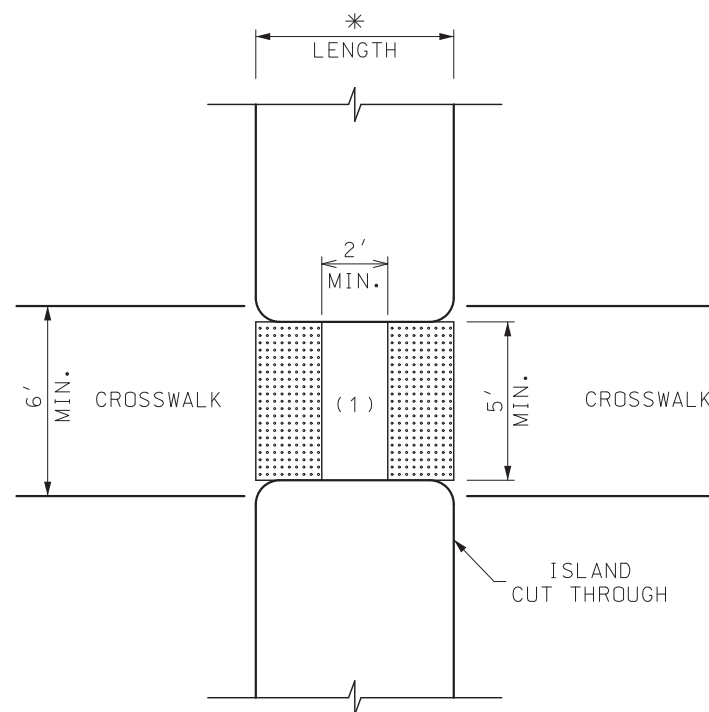
MIDBLOCK



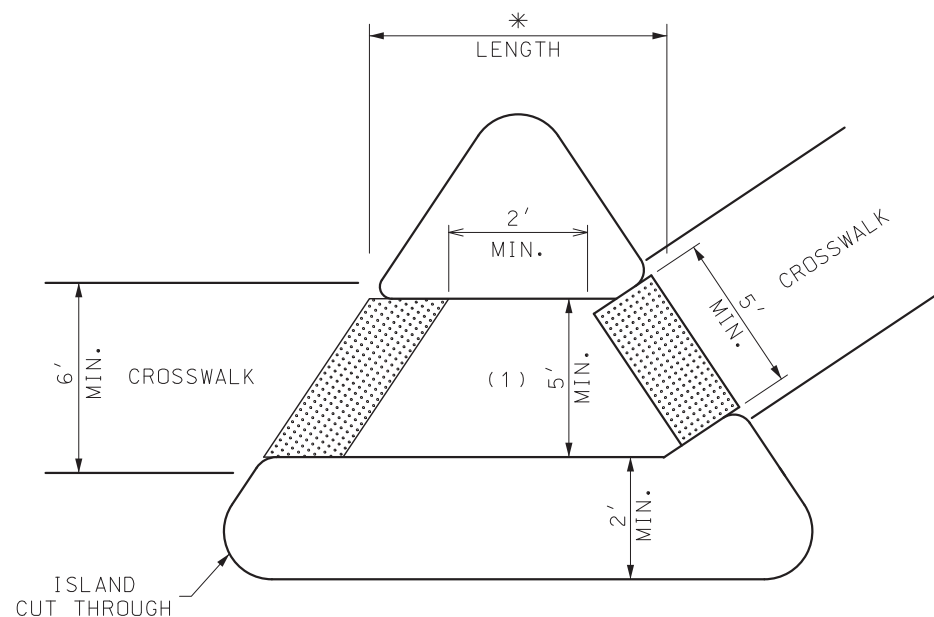
SECTION A-A  
ISLAND CUT THROUGH TYPICAL

RAMP OR CUT-THROUGH DEPENDING  
ON ISLAND WIDTH. IF RAMPED,  
PROVIDE 4' MINIMUM LANDING AND  
SLOPE RAMPS AT 1V:12H MAX.

RAMP MUST BE CONSTRUCTED TO  
DRAIN TO THE OUTSIDE.



ISLAND CUT THROUGH

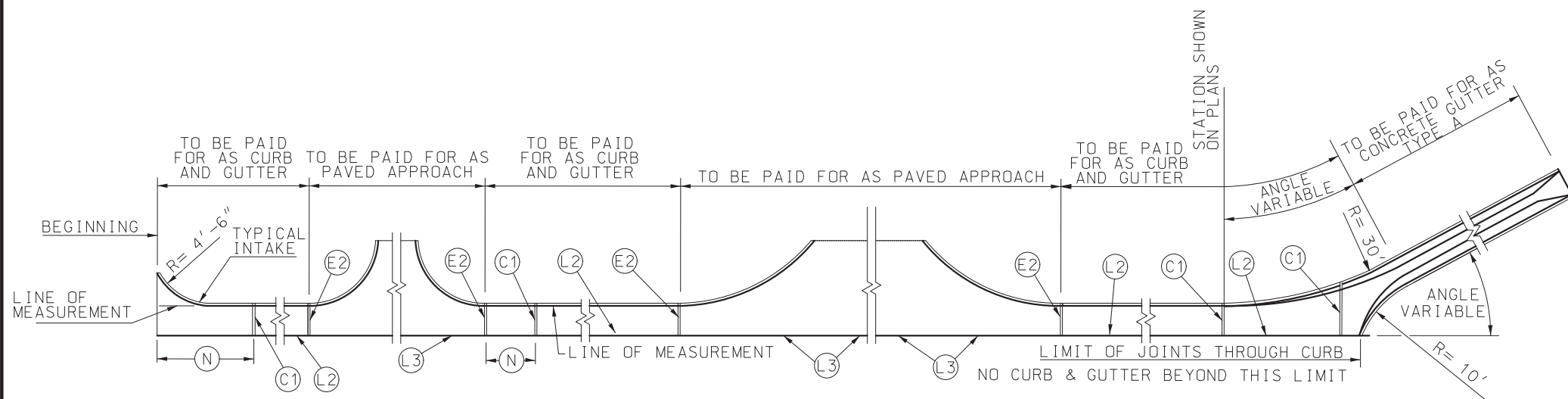


- (1) DETECTABLE WARNING SURFACES SHALL BE PLACED AT THE EDGES OF THE PEDESTRIAN ISLAND AND SHALL BE SEPARATED BY 2' MIN. LENGTH OF SURFACE WITHOUT DETECTABLE WARNINGS.
- (2) PEDESTRIAN PUSH BUTTONS SHALL BE OFFSET 0" FOR FRONT APPROACH AND 10" MAX. FOR SIDE APPROACH TO THE CURB FACE.

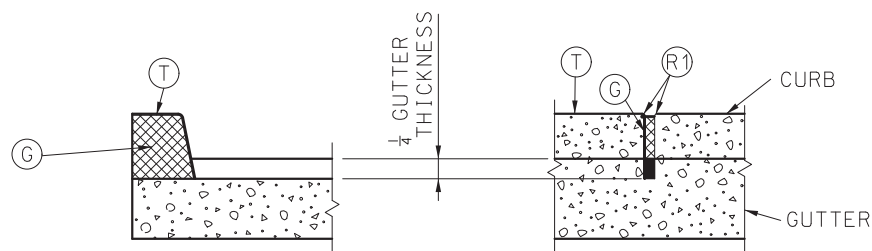
\* DETECTABLE WARNING SURFACES SHALL BE OMITTED IF LENGTH IS < 6', BECAUSE REFUGE SPACE IS DEEMED TOO SMALL.

|                                                                                                                                                                                                                                  |                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                          |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <p><b>CURB RAMPS</b></p> |
| DATE EFFECTIVE: 01/01/2023<br>DATE PREPARED: 10/6/2022                                                                                                                                                                           | <p><b>608.50A</b></p>    |
| SHEET NO.<br>4 of 4                                                                                                                                                                                                              |                          |

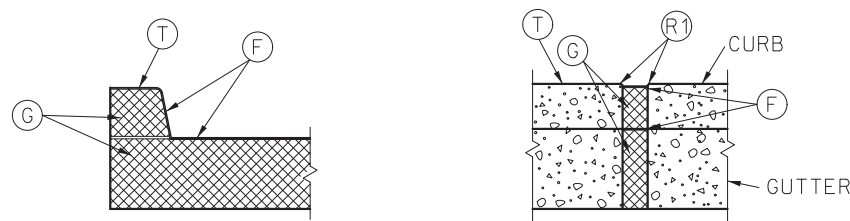




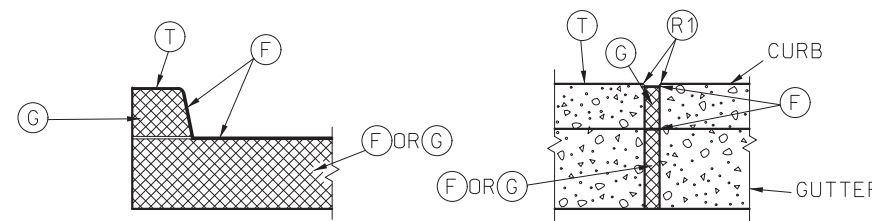
PLAN OF MEASUREMENT OF CURB & GUTTER AND JOINT PLAN



C1 JOINT



E1 JOINT



E2 JOINT

LEGEND

- C1 1/8" MAXIMUM WIDTH TRANSVERSE CONTRACTION JOINT (PREFORMED OR SAWED).
- E1 2" TRANSVERSE EXPANSION JOINT (PREFORMED OR SAWED).
- E2 1/2" TRANSVERSE EXPANSION JOINT (PREFORMED OR SAWED).
- F FILLER FOR JOINTS - HOT POURED.
- G PREFORMED JOINT FILLER MATERIAL.
- L2 LONGITUDINAL JOINT WITH TIE BARS.
- L3 LONGITUDINAL JOINT WITHOUT TIE BARS.
- N NOT LESS THAN 10' OR MORE THAN 30'.
- T TOP OF CURB.
- R1 ROUND TO 1/4" RADIUS (EXCEPT FOR SAWED JOINTS).

GENERAL NOTES:

A MINIMUM 4" TYPE 1 OR 5 AGGREGATE BASE SHALL BE PLACED BENEATH ALL CURB AND GUTTER SECTIONS AND INCLUDED WITHIN THE MAINLINE BASE PAY LIMITS.

WHEN CURBS ARE CONSTRUCTED DIRECTLY BENEATH GUARDRAIL, CURB HEIGHT SHALL BE 4 INCH BARRIER CURB, AS SHOWN ON STANDARD PLAN 606.00.

CURB, GUTTER AND CURB AND CUTTER CONSTRUCTED ALONG AND ATTACHED TO CONCRETE PAVEMENT OR BASE SHALL HAVE:

- JOINT C1 ONE-QUARTER DEPTH OF CURB AND GUTTER THICKNESS AS A CONTINUATION OF EACH CONTRACTION JOINT IN THE BASE OR PAVEMENT.
- JOINT E1 AS CONTINUATION OF 2" EXPANSION JOINT E IN THE CONCRETE BASE OR PAVEMENT SHALL EXTEND AND CONTINUE THROUGH THE CURB, CUTTER AND CURB AND GUTTER.
- JOINT E2 THROUGH CURB AND CURB AND CUTTER AT THE BEGINNING AND END OF EACH PAVED APPROACH.

CURB, CURB AND GUTTER AND GUTTER CONSTRUCTED APART OR SEPARATED FROM CONCRETE BASE OR PAVEMENT OR AS A FORM FOR ASPHALTIC CONCRETE PAVEMENT SHALL HAVE A JOINT E2 ENTIRELY THROUGH THE CURB, CURB AND GUTTER AND GUTTER, AT THE BEGINNING AND END OF EACH "PAVED APPROACH" AND A JOINT C1 TO 1/4 DEPTH OF CURB AND GUTTER THICKNESS AT INTERVALS OF 30 FEET BETWEEN APPROACHES.

JOINTS E1 AND E2 THROUGH CURB SHALL BE FILLED WITH PREFORMED FILLER MATERIAL AND SEALED WITH HOT POURED FILLER FOR JOINTS.

JOINT E1 IN GUTTER SHALL BE FILLED WITH PREFORMED FILLER AND SEALED WITH HOT FILLER MATERIAL.

JOINT E2 IN GUTTER SHALL BE FILLED WITH PREFORMED FILLER AND SEALED WITH FILLER OR FILLED WITH HOT POURED FILLER.

PREFORMED FILLER MATERIAL SHALL BE PLACED TO PROVIDE 1" HOT POURED FILLER FOR JOINTS.

THE BARRIER CLASS CURBS MAY BE CONSTRUCTED WITHOUT BATTER WHEN CONSTRUCTED ON A RADIUS OF 6 FEET OR LESS. THE R2 WILL BE REQUIRED.

WHERE A SIDEWALK INTERSECTS A CURB, THE SIDEWALK SHALL BE RAMPED NO STEEPER THAN 12:1 SLOPE TO PROVIDED ACCESS FOR WHEELCHAIR ACROSS APPROACHES.

PRECAST TYPE A AND B GUTTER ARE ONLY ALLOWED WHEN CONSTRUCTABILITY ISSUES MAKE CAST IN PLACE NOT PRACTICAL. PRECAST IS ONLY ALLOWED WITH THE APPROVAL OF THE ENGINEER. WHEN ALLOWED BY THE ENGINEER, TYPES A AND B GUTTER MAY BE PRECAST TO CONFORM TO THE DIMENSIONS SHOWN. THE PRECASTER SHALL SUBMIT SHOP DRAWINGS INDICATING THE SECTION LENGTH, SECTION CONNECTION, AND PROPOSED JOINT SEALING SYSTEM. WHEN PRECAST SECTIONS CANNOT CONFORM TO ANY VERTICAL OR HORIZONTAL CURVE THEN CAST IN PLACE IS THE ONLY OPTION. A COMBINATION OF CAST IN PLACE AND PRECAST GUTTER MAY BE PERMITTED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

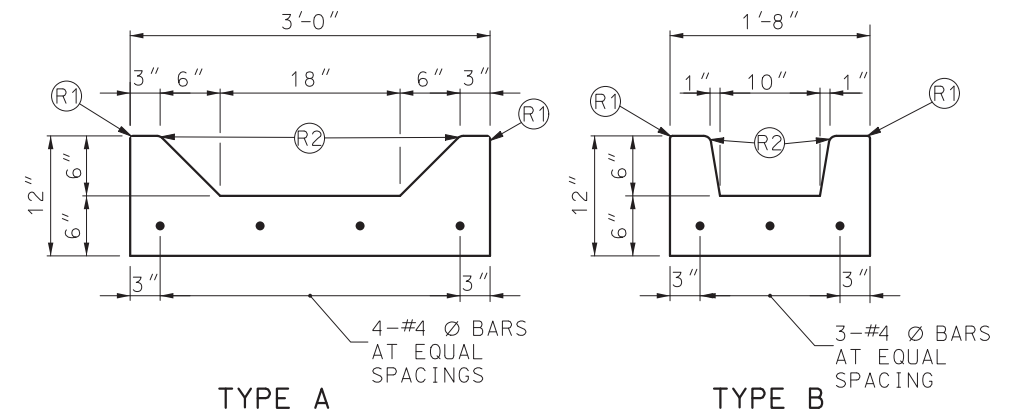
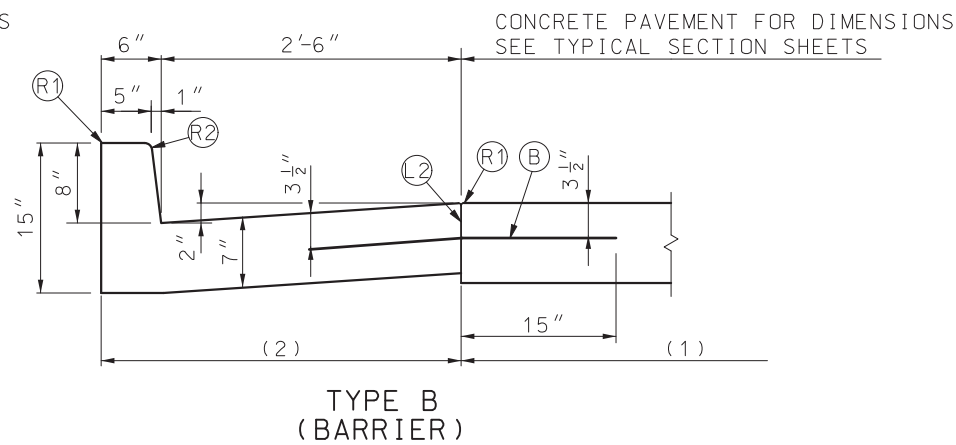
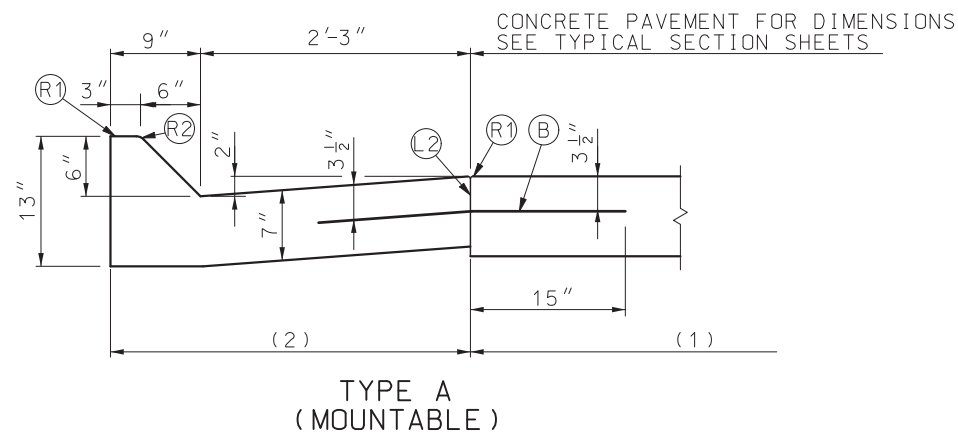
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

CONCRETE CURB,  
CURB AND GUTTER,  
AND GUTTER

DATE EFFECTIVE: 1/1/2025  
DATE PREPARED: 10/4/2024

609.00R

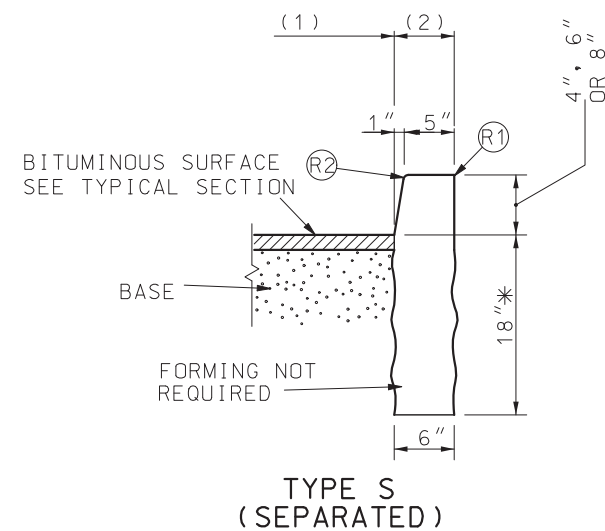
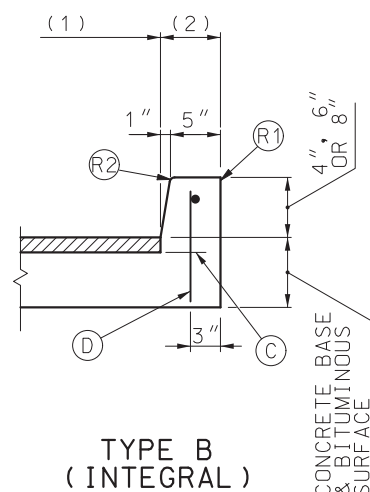
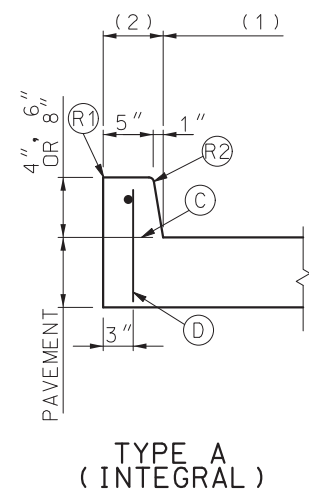
SHEET NO.  
1 OF 2



## CURB & GUTTER

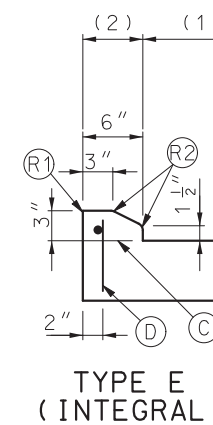
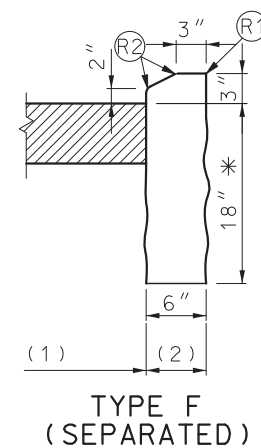
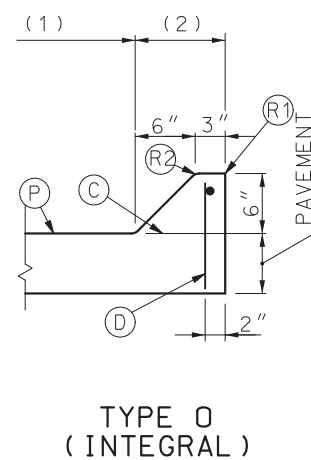
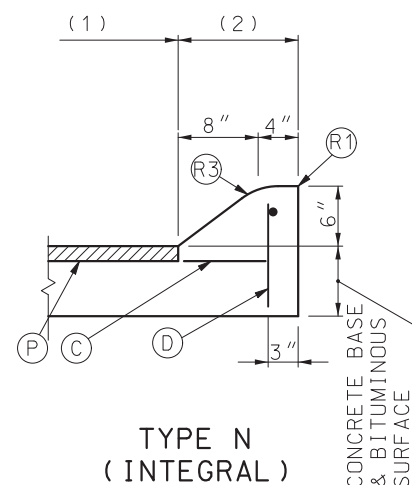
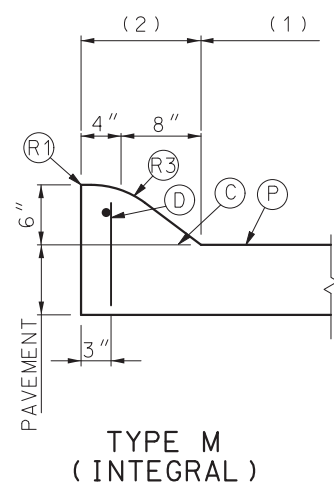
## GUTTERS

SEE STANDARD PLAN 607.11 FOR MODIFIED TYPE A AND B GUTTERS



\* DEPTH MAY BE REDUCED IF KEYED 6" IN ROCK

## BARRIER CURBS



BEGINNING AND ENDING OF INTRODUCED LOW PROFILE CURB SHALL UTILIZE CURB HEIGHT RUNOUT FORM 0 INCHES TO 3 INCHES IN 5 FEET. PAYMENT LENGTH SHALL INCLUDE TAPERS.

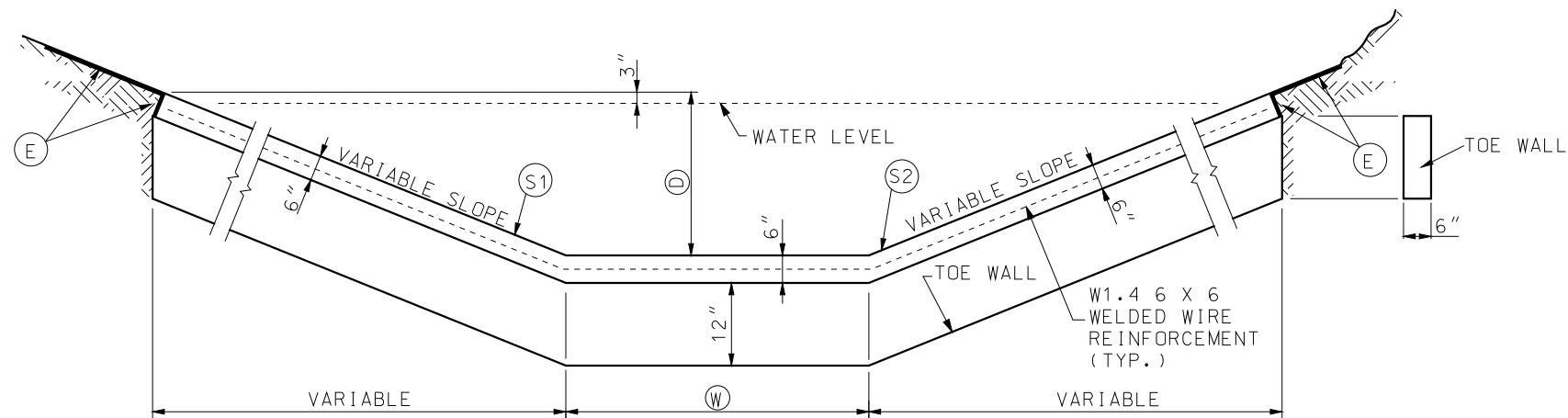
\* DEPTH MAY BE REDUCED IF KEYED 6" IN ROCK.

## LOW PROFILE CURB

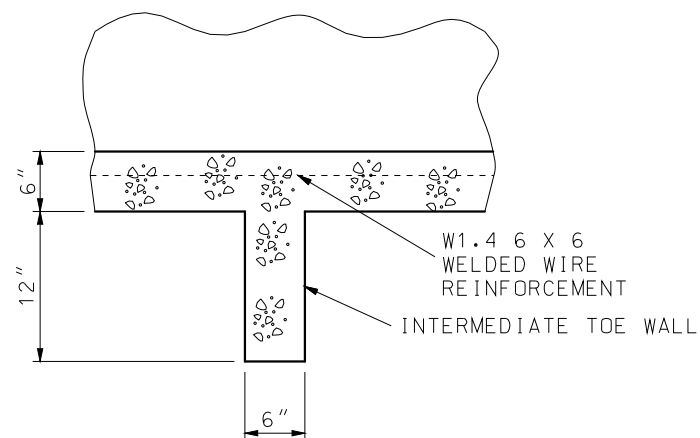
### LEGEND

- (B) TIE BARS - 30" X #5 Ø AT 30" CTRS.
- (C) PERMISSIBLE CONSTRUCTION JOINT. IF CONSTRUCTED IN THIS MANNER LONGITUDINAL AND TIE BARS MUST BE USED.
- (D) #3 OR #4 Ø EPOXY COATED LONGITUDINAL AND TIE BARS. LONGITUDINAL BAR GAPPED 4" AT JOINTS AND ANY SPLICES LAPPED 8". TIE BARS AT 24" CENTERS AND LENGTH EQUALS THICKNESS OF PAVEMENT PLUS HEIGHT OF CURB MINUS 3". MINIMUM 1" COVER OVER ALL BARS.
- (L2) LONGITUDINAL JOINT WITH TIE BARS.
- (P) TOP OF PAVEMENT OR CONCRETE BASE.
- (R1) ROUND TO 1/4" RADIUS (EXCEPT FOR SAWED JOINTS).
- (R2) ROUND TO 3/4" RADIUS.
- (R3) CONSTRUCT TO 9" RADIUS.
- (1) PAY LIMIT FOR PAVEMENT
- (2) PAY LIMIT FOR CURB, OR CURB & GUTTER.

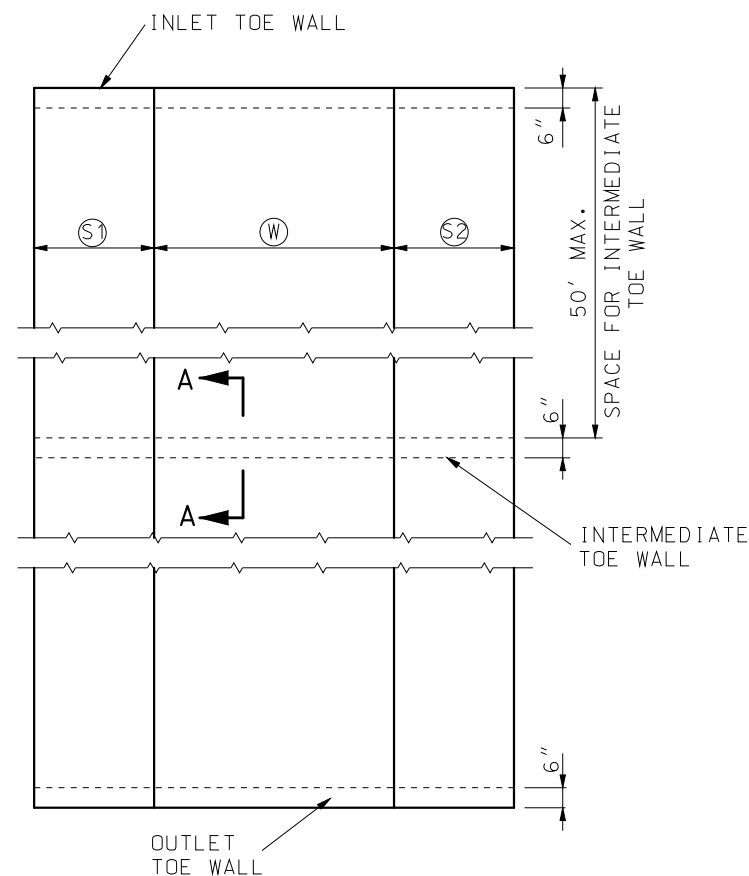
|                                                                                                                                                                                                                                  |                                                   |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                   |                     |
|                                                                                                                                             | <b>CONCRETE CURB, CURB AND GUTTER, AND GUTTER</b> |                     |
| DATE EFFECTIVE: 1/1/2025<br>DATE PREPARED: 10/4/2024                                                                                                                                                                             | <b>609.00R</b>                                    | SHEET NO.<br>2 OF 2 |



SECTION THROUGH DITCH  
(SHOWING TOE WALL)



SECTION A-A



PLAN

LEGEND

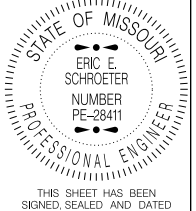
- (D) VERTICAL PAVED DITCH HEIGHT.
- (E) SOD, GEOTEXTILE FABRIC, OR EROSION CONTROL MAT, IF REQUIRED.
- (S1) THE WIDTH OF THE STEEPER SIDEWALL OF ALL DITCHES.
- (S2) THE WIDTH OF THE FLATTER SIDEWALL OF ALL DITCHES.
- (W) THE WIDTH OF THE BOTTOM OF A FLAT BOTTOM DITCH

GENERAL NOTES:

STEEL WELDED WIRE REINFORCEMENT SHALL BE IN ACCORDANCE WITH SEC 1036.3.3.

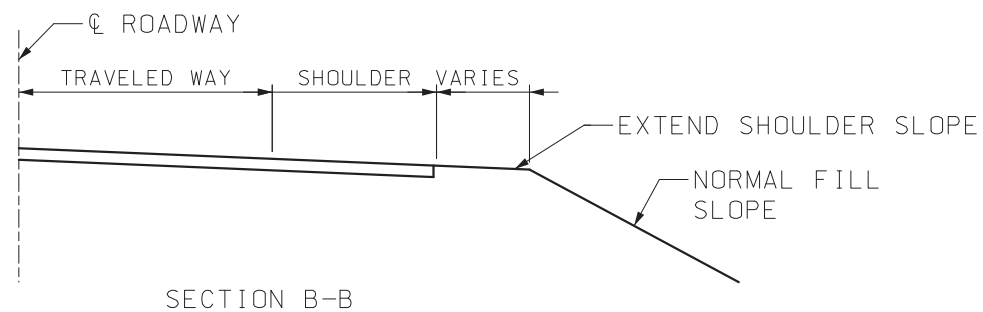
SOD, GEOTEXTILE FABRIC, OR EROSION CONTROL MATS SHALL BE USED ALONG THE SIDES IF SHOWN ON THE PLANS, OR AS DIRECTED BY THE ENGINEER.

TOE WALLS SHALL BE CONSTRUCTED AT INLET AND OUTLET ENDS OF PAVED DITCHES AND AT 50' MAXIMUM SPACING FOR INTERMEDIATE TOE WALLS.

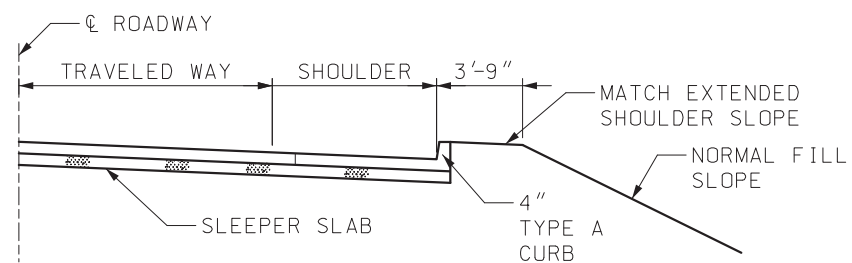
|                                                                                                                                                                                                                                  |                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                    |
|                                                                                                                                             | <p style="text-align: center; font-size: 1.2em;">PAVED DITCHES</p> |
| DATE EFFECTIVE: 07/01/2016<br>DATE PREPARED: 5/13/2016                                                                                                                                                                           | 609.15D                                                            |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                                                    |



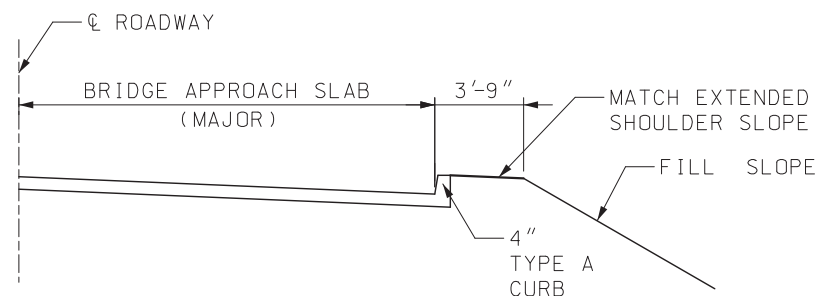




SECTION B-B

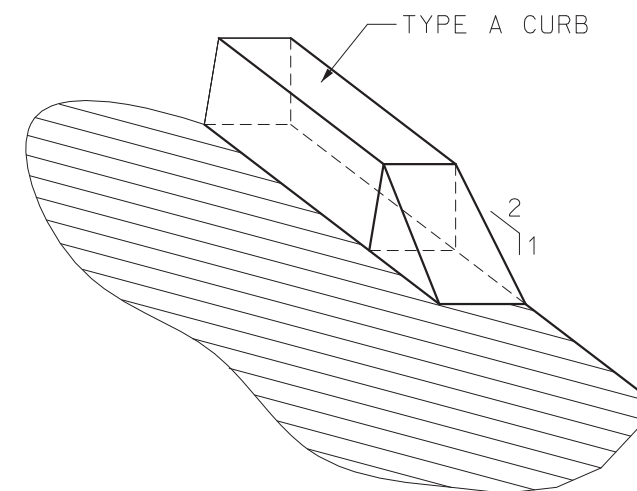


SECTION C-C



SECTION D-D

NOTE: FOR DETAILS NOT SHOWN,  
SEE OTHER SECTIONS.



TYPE A CURB  
TRANSITION DETAIL

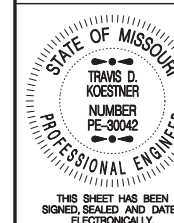
GENERAL NOTE:

FOR LOCATION OF SEC. B-B, C-C AND D-D, SEE  
SHEET 1 OF 3.



**MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



DATE EFFECTIVE: 10/1/2023  
DATE PREPARED: 7/6/2023

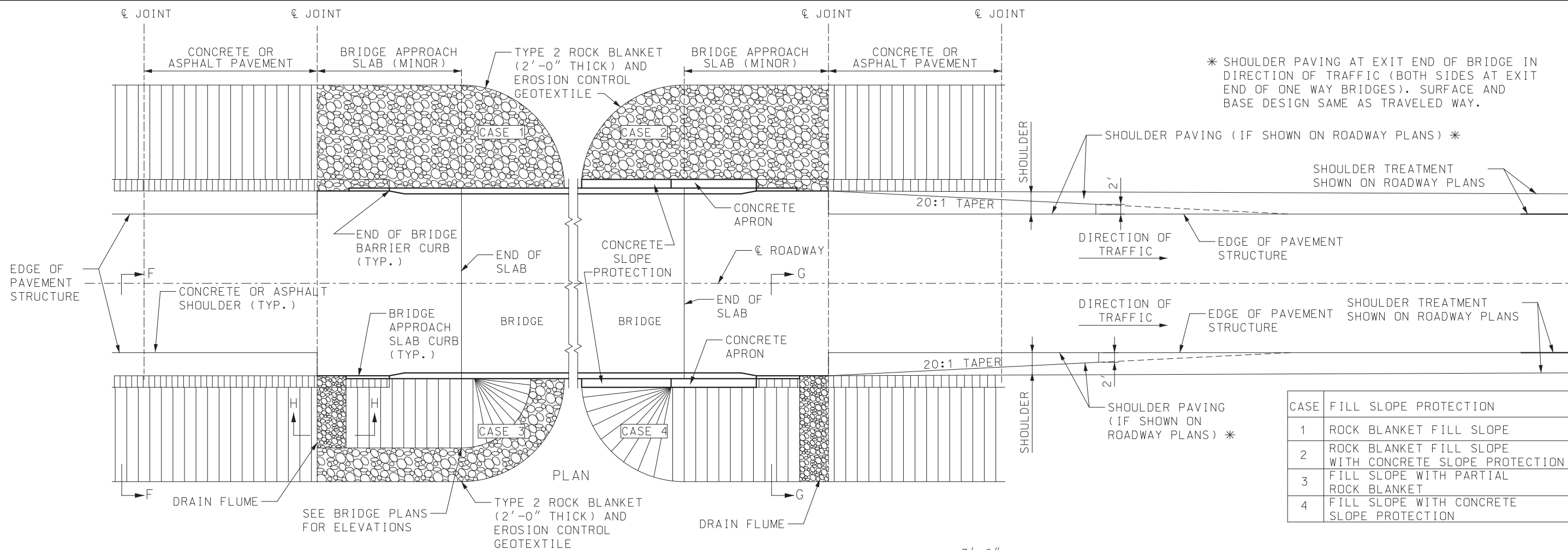
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SHEET NO.  
2 OF 3

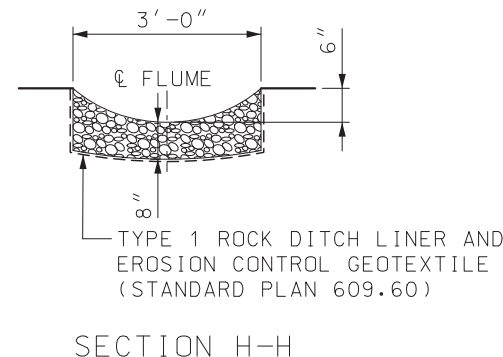
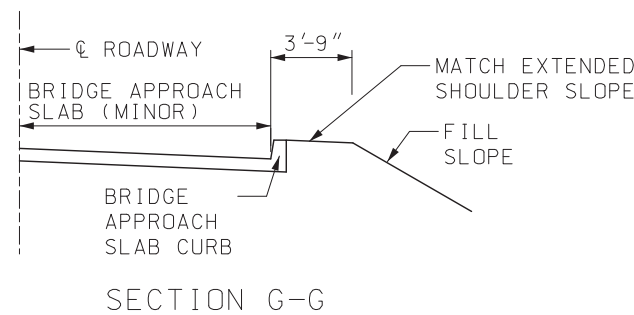
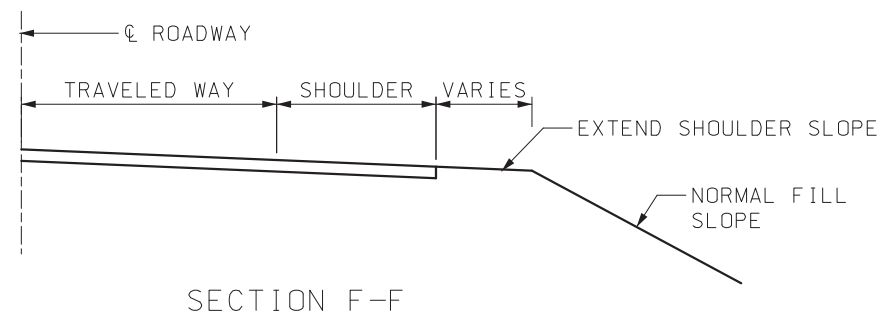
**DRAIN BASIN, SHOULDER  
PAVING AND FILL SLOPE  
AT BRIDGE ENDS**

**(MAJOR ROUTE)**

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| CASE | FILL SLOPE PROTECTION                                  |
|------|--------------------------------------------------------|
| 1    | ROCK BLANKET FILL SLOPE                                |
| 2    | ROCK BLANKET FILL SLOPE WITH CONCRETE SLOPE PROTECTION |
| 3    | FILL SLOPE WITH PARTIAL ROCK BLANKET                   |
| 4    | FILL SLOPE WITH CONCRETE SLOPE PROTECTION              |



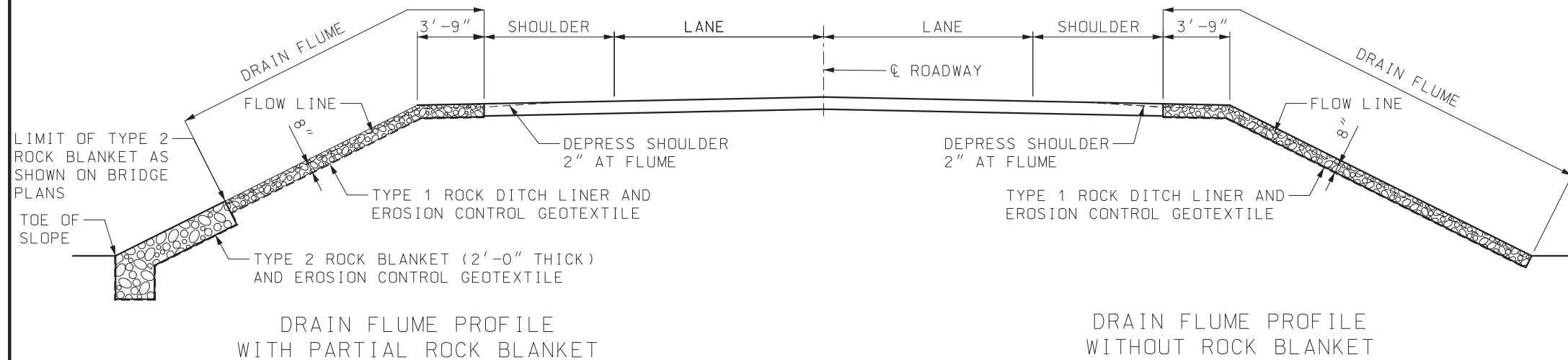
GENERAL NOTES:

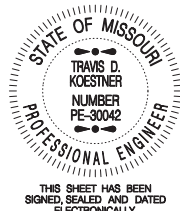
SEE STANDARD PLANS 606.00, 606.22, 606.23, 606.30, 606.50, 606.60, 606.70 AND 606.80 FOR DETAILS OF GUARDRAILS AND BRIDGE ANCHOR SECTIONS.

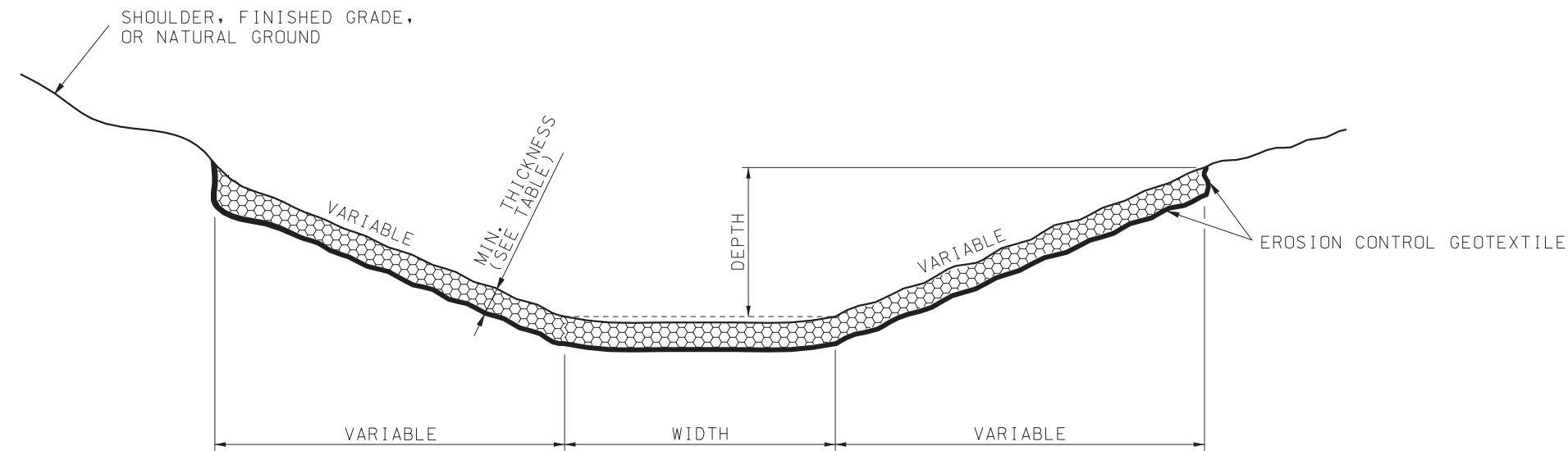
FOR DETAILS OF BRIDGE APPROACH SLAB (MINOR ROAD), SEE BRIDGE PLANS.

CONSTRUCT DRAIN FLUMES AND/OR FILL SLOPE PROTECTION WHEN SHOWN ON ROADWAY PLANS.

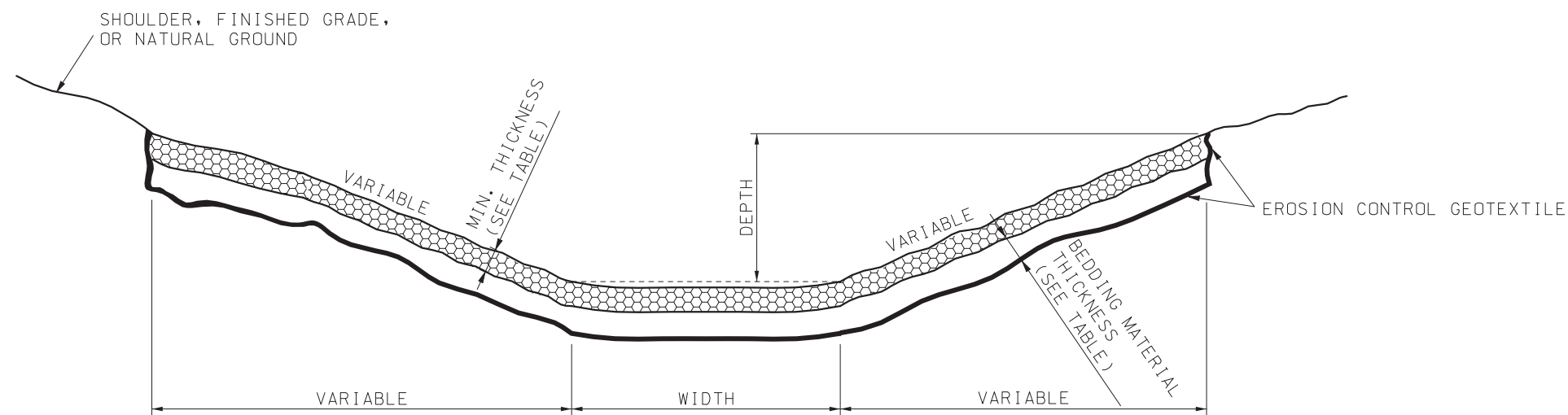
PAYMENT FOR DRAIN FLUMES, COMPLETE IN PLACE, INCLUDING EXCAVATION, WILL BE PAID FOR AS TYPE 1 ROCK DITCH LINER. GEOTEXTILE WILL BE PAID SEPARATELY.



|                                                                                                                                                                                                                                  |                                                                                                        |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                        |         |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>DRAIN FLUME, SHOULDER PAVING AND FILL SLOPE AT BRIDGE ENDS</b><br><br>(MINOR AND LOW VOLUME ROUTES) |         |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 10/1/2023<br>DATE PREPARED: 7/6/2023                                                   | 609.40U |



FLAT BOTTOM DITCH  
WITHOUT BEDDING MATERIAL



FLAT BOTTOM DITCH  
WITH BEDDING MATERIAL

TYPICAL DITCH LINER DETAILS

| TYPE | ROCK DITCH<br>LINER<br>MIN. THICKNESS | BEDDING MATERIAL<br>MIN. THICKNESS |
|------|---------------------------------------|------------------------------------|
| 1    | 8"                                    | --                                 |
| 2    | 12"                                   | --                                 |
| 3    | 22"                                   | 8"                                 |
| 4    | 30"                                   | 12"                                |



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER

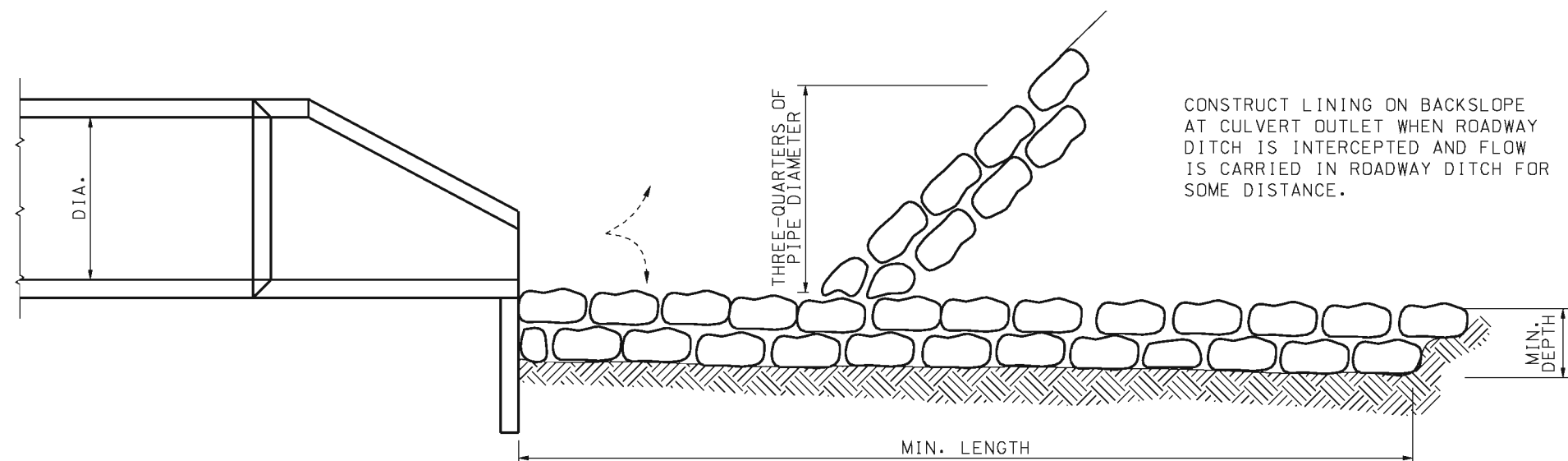
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

## ROCK DITCH LINER

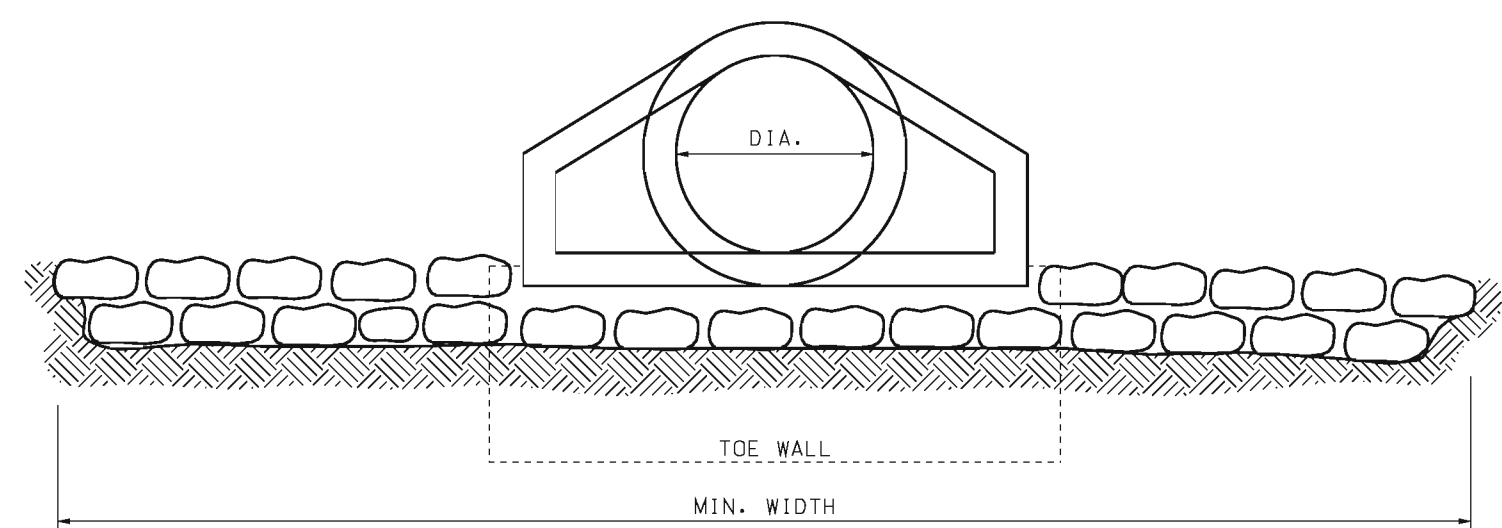
DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 4/5/2023

609.60D

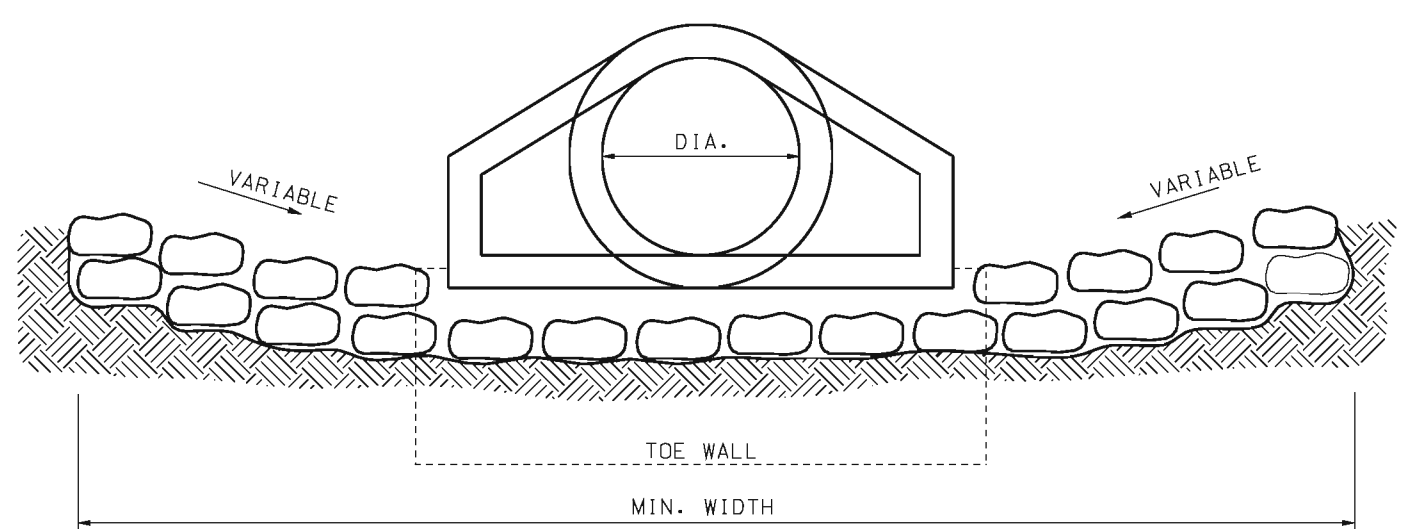
SHEET NO.  
1 OF 1



SIDE VIEW



END VIEW



END VIEW  
(ALTERNATE METHOD)

| ROCK LINING FOR CULVERT OUTLETS |                               |                      |                      |                                        |                                           |
|---------------------------------|-------------------------------|----------------------|----------------------|----------------------------------------|-------------------------------------------|
| CULVERT SIZE, DIA (IN.)         | MINIMUM DEPTH AND WIDTH (FT.) | MINIMUM LENGHT (FT.) | ROCK LINING (CU.YD.) | EQUIVALENT PIPE ARCH CULVERT (APPROX.) | EQUIVALENT CONCRETE BOX CULVERT (APPROX.) |
| 18                              | 1 X 4                         | 12                   | 2                    |                                        |                                           |
| 24                              | 1 X 6                         | 14                   | 3                    |                                        | 2' X 1 1/2'                               |
| 30                              | 1 X 7                         | 16                   | 4                    | B-5                                    | 2' X 2'                                   |
| 36                              | 1.5 X 9                       | 18                   | 9                    | B-6                                    | 3' X 2'                                   |
| 42                              | 2 X 10                        | 20                   | 15                   | B-7                                    | 3' X 3'                                   |
| 48                              | 2 X 12                        | 20                   | 18                   | B-8                                    | 4' X 3'                                   |
| 54                              | 2 X 13.5                      | 22                   | 22                   | B-9                                    | 4' X 4'                                   |
| 60                              | 2 X 15                        | 25                   | 28                   | B-10                                   | 5' X 4'                                   |
| 66                              | 2 X 18                        | 25                   | 33                   | B-11                                   | 5' X 5'                                   |
| 72                              | 2 X 20                        | 30                   | 44                   | B-12                                   | 5' X 6'                                   |
| 84                              | 2.5 X 25                      | 35                   | 81                   |                                        | 6' X 6'                                   |
| 96                              | 2.5 X 30                      | 40                   | 111                  |                                        | 7' X 7'                                   |
| 108                             | 3 X 32                        | 40                   | 142                  |                                        | 8' X 8'                                   |

GENERAL NOTES:

THE DIMENSIONS SHOWN IN THE TABLE CAN BE APPLIED TO BOX OR ARCH CULVERTS OF EQUIVALENT WATERWAY AREA.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

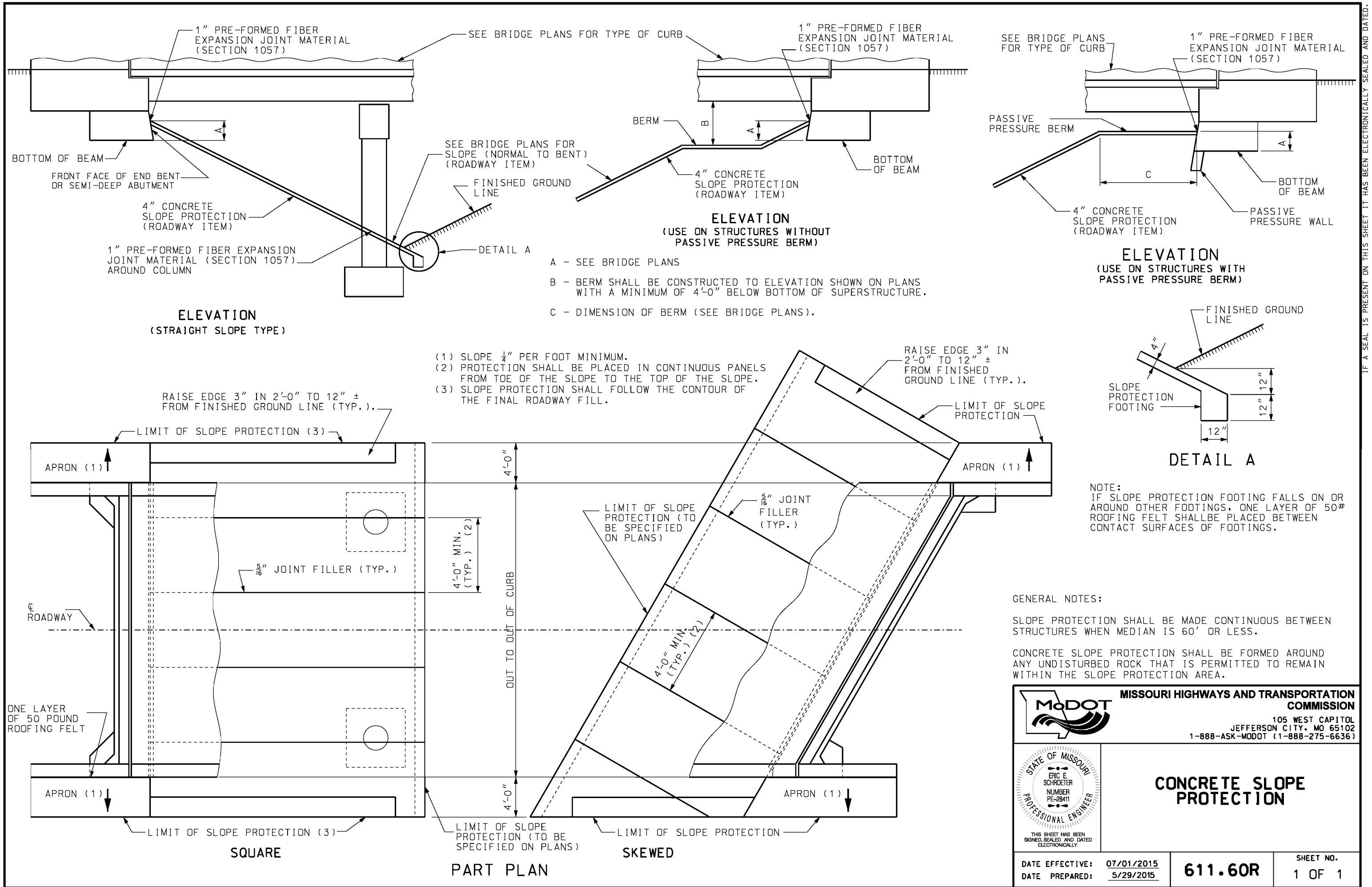
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**ROCK LINING FOR CULVERT OUTLET**

DATE EFFECTIVE: 10/01/1981  
DATE PREPARED: 8/21/2009

**609.70C**

SHEET NO.  
1 OF 1



IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

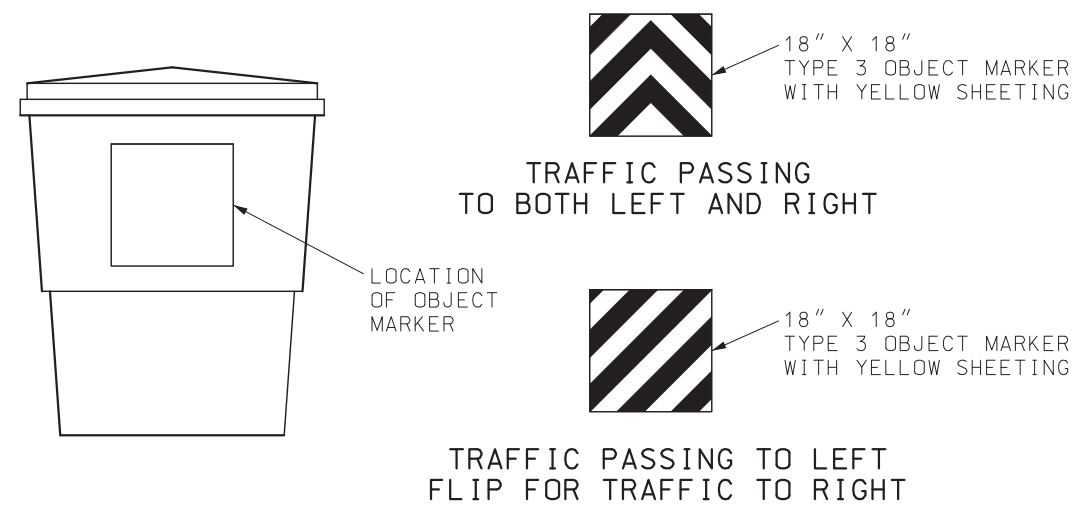


**CONCRETE SLOPE PROTECTION**

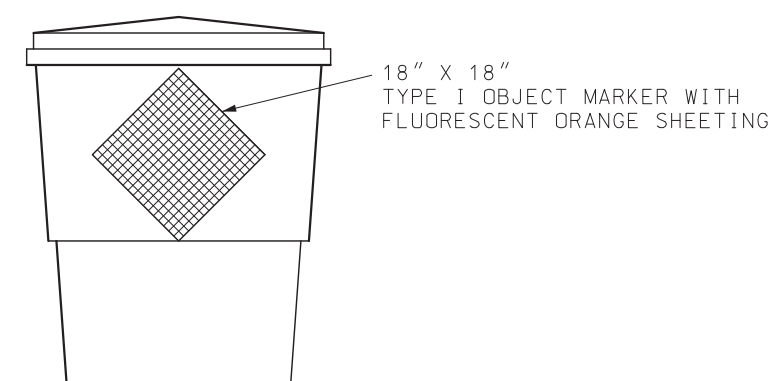
|                 |            |                |                     |
|-----------------|------------|----------------|---------------------|
| DATE EFFECTIVE: | 07/01/2015 | <b>611.60R</b> | SHEET NO.<br>1 OF 1 |
| DATE PREPARED:  | 5/29/2015  |                |                     |

**ATTENUATOR LAYOUT:**

**ALL SAND FILLED ATTENUATORS SHOULD MEET MANUFACTURER'S RECOMMENDATIONS FOR THE ARRAY AND SAND WEIGHT.**



**TYPE 3 OBJECT MARKER PLACEMENT FOR PERMANENT INSTALLATIONS**



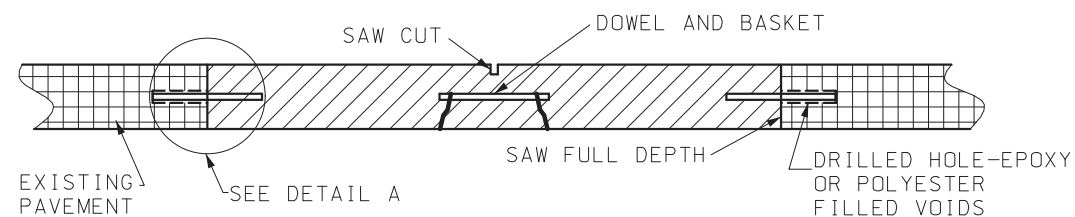
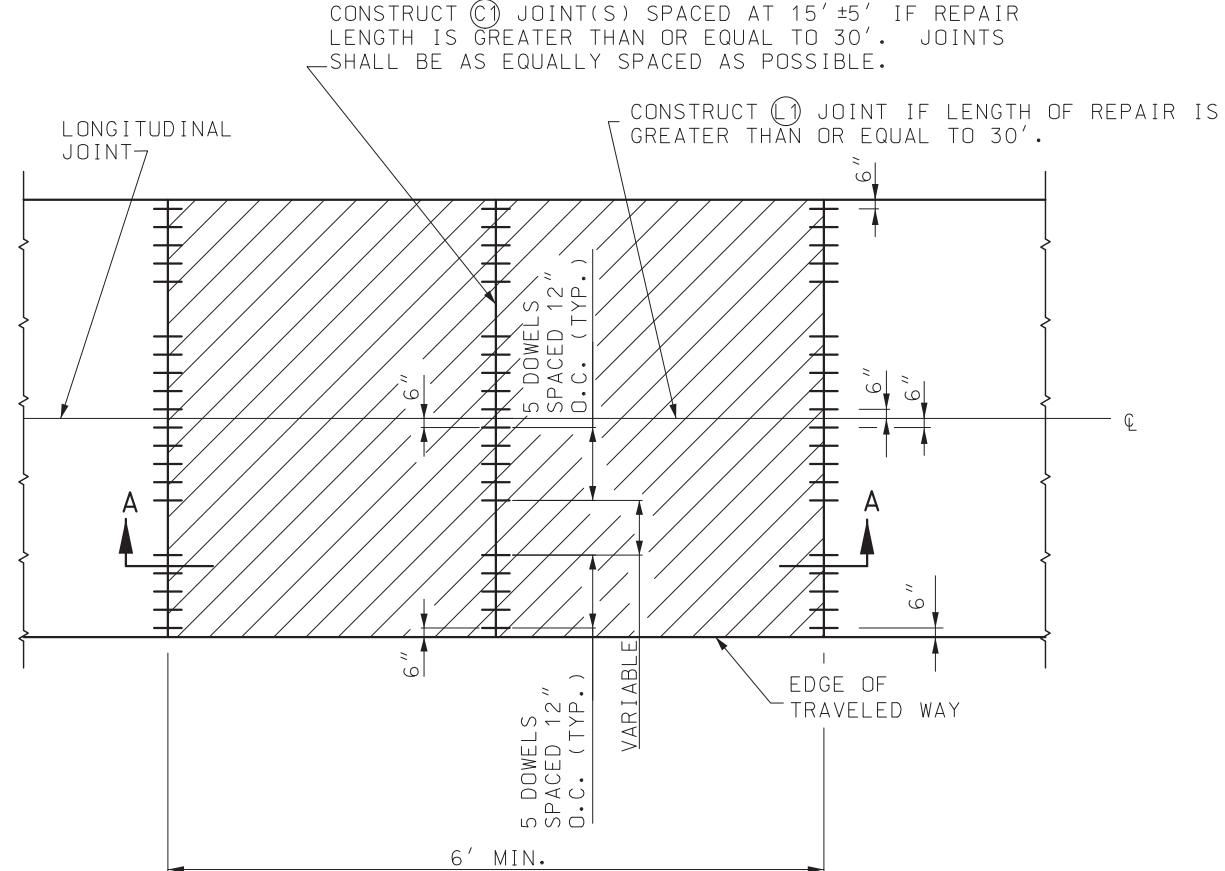
**TYPE I OBJECT MARKER PLACEMENT FOR TEMPORARY INSTALLATIONS**

**GENERAL NOTES:**

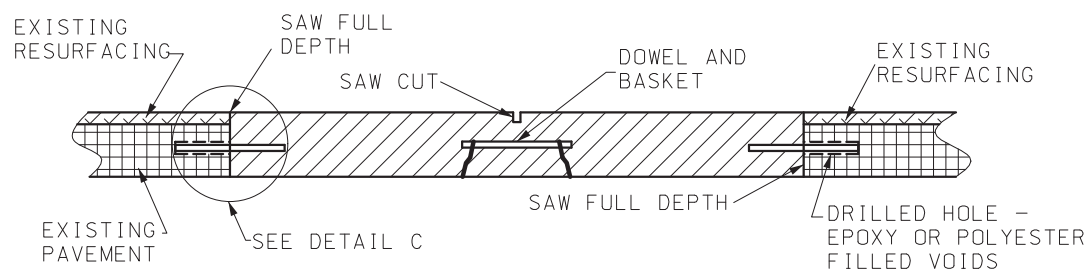
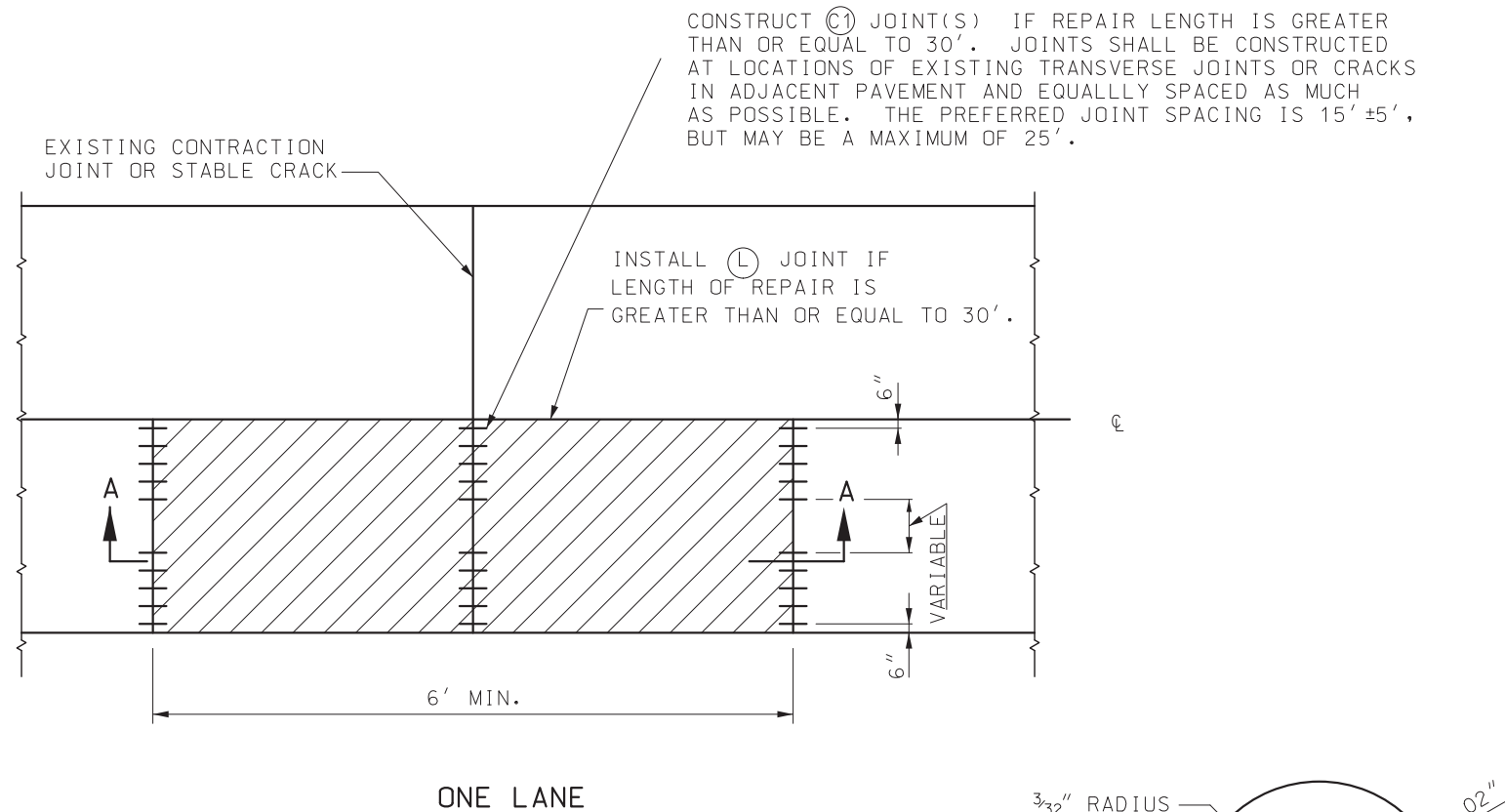
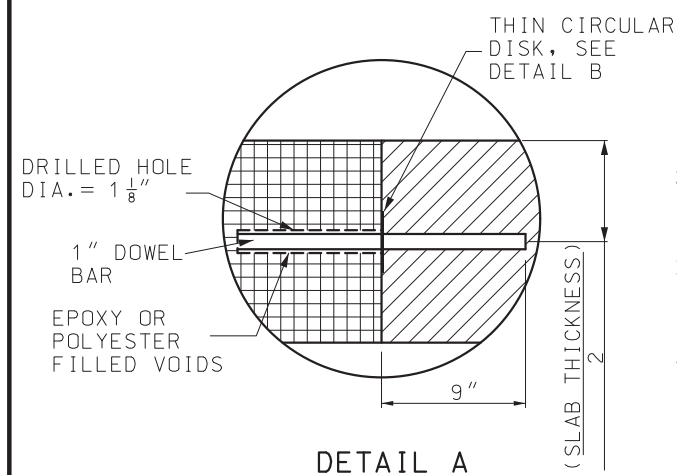
OBJECT MARKER SHALL BE PLACED ON THE LEAD MODULE FACING TRAFFIC.

|                                                                                                                                                                                                                                                                       |                                           |                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                      |                                           |                     |
|  <p>STATE OF MISSOURI<br/>KENNETH L. VOSS<br/>NUMBER<br/>PE-2002016747<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <b>SAND FILLED<br/>IMPACT ATTENUATORS</b> |                     |
| DATE EFFECTIVE: 4/1/2024<br>DATE PREPARED: 1/16/2024                                                                                                                                                                                                                  | <b>612.20F</b>                            | SHEET NO.<br>1 OF 1 |

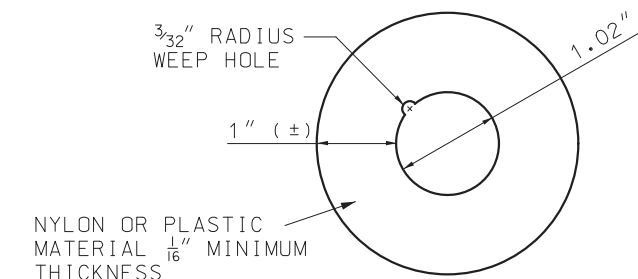
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



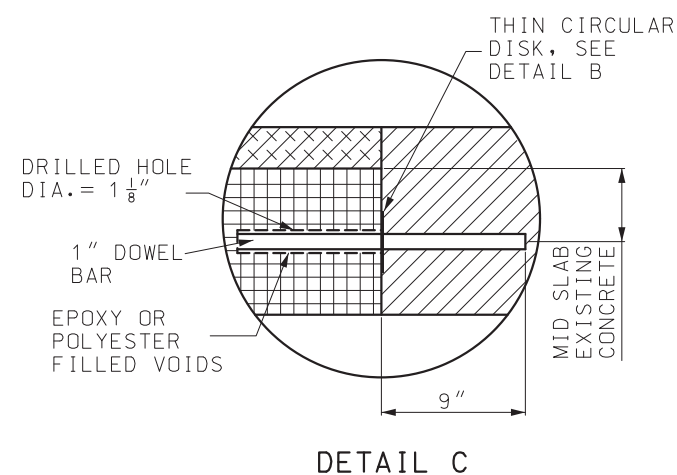
SECTION A-A



SECTION A-A ALTERNATE  
WITH ASPHALT OVERLAY



THIN CIRCULAR DISK



DETAIL C

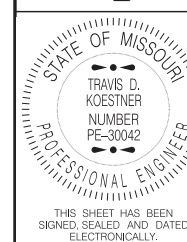
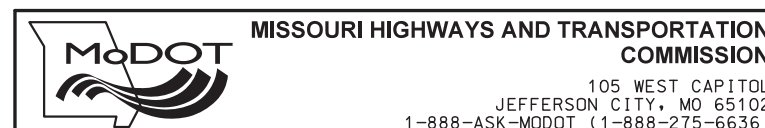
1. SMOOTH EPOXY COATED DOWELS SHALL BE USED IN ALL FULL DEPTH PAVEMENT REPAIR TRANSVERSE JOINTS.
2. THE ANCHORING MATERIAL (EPOXY OR POLYESTER) SHALL BE PLACED TO THE BACK OF THE PREDRILLED HOLE BEFORE INSERTING THE DOWEL BAR.
3. THE DOWEL IS INSERTED INTO THE HOLE WITH A TWISTING MOTION SO THAT THE MATERIAL IN THE BACK OF THE HOLE IS FORCED UP AND AROUND THE BAR.
4. EXPOSED END OF DOWEL SHALL BE COATED WITH A THIN UNIFORM COAT OF GRAPHITE GREASE. DOWEL BASKET ASSEMBLIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD PLAN 502.10. IN LIEU OF GRAPHITE GREASE, THE DOWEL BAR BASKET SUPPLIER MAY PROVIDE COMPLETED BASKET UNITS PRE-DIPPED IN AN APPROVED BONDBREAKER.
5. REPAIR ONLY ONE LANE AT A TIME.

## NON-REINFORCED AND REINFORCED PORTLAND CEMENT CONCRETE

GENERAL NOTES:

ALL SAW CUTS SHALL BE MADE WITH A DIAMOND SAW EXCEPT THE CENTER RELIEF CUT.

FOR DETAILS OF TYPE (C), (L) AND (L1) JOINTS. SEE  
STANDARD PLAN 502.05.



## PAVEMENT REPAIR

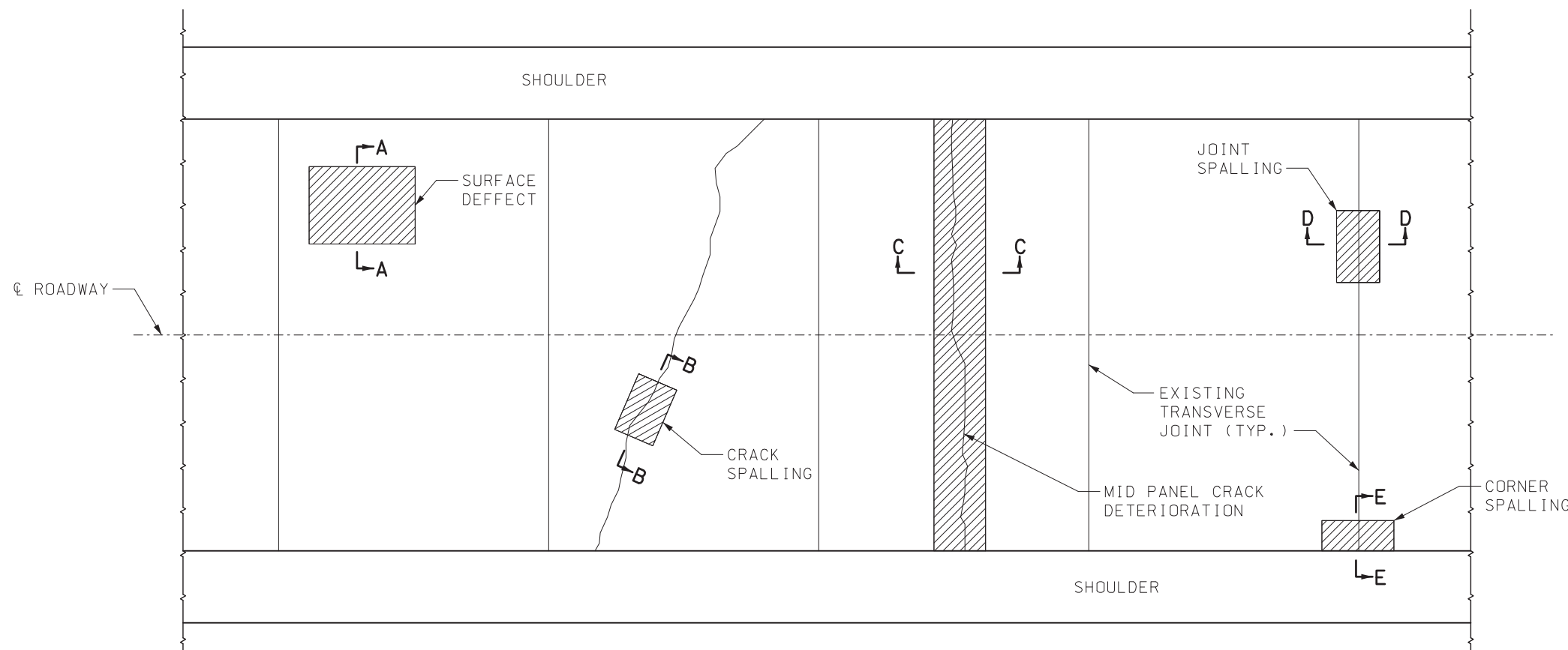
### FULL DEPTH

DATE EFFECTIVE: 01/01/2020  
DATE PREPARED: 10/17/2019

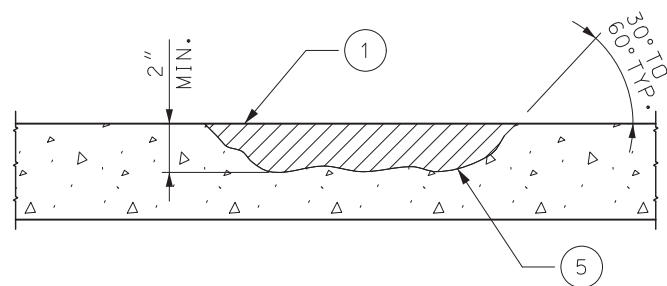
613.00T

SHEET NO.  
1 OF 4

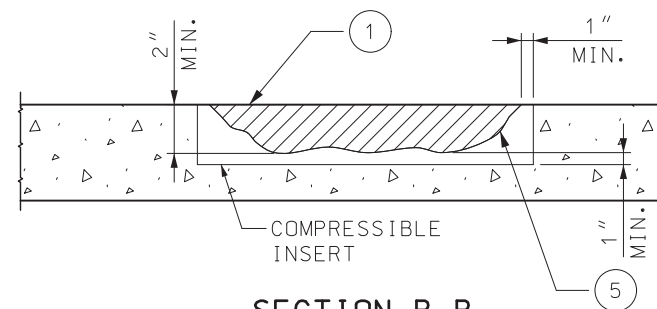




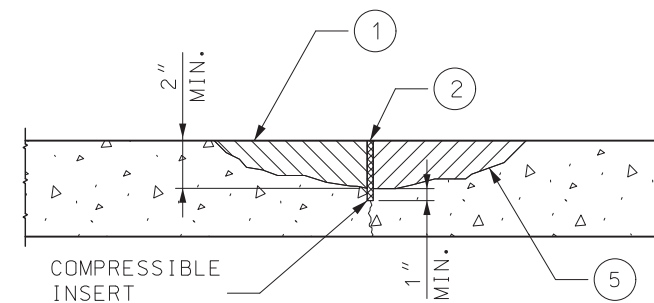
PLAN VIEW



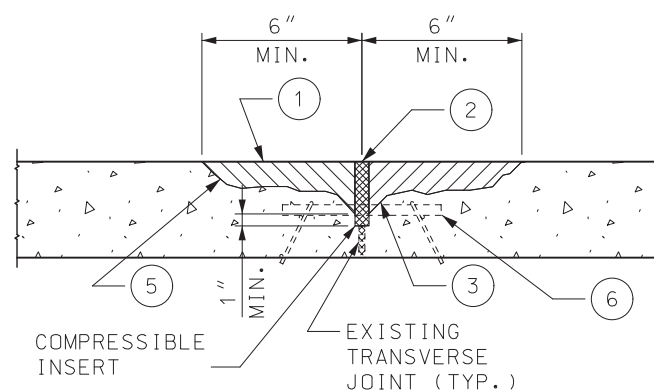
SECTION A-A



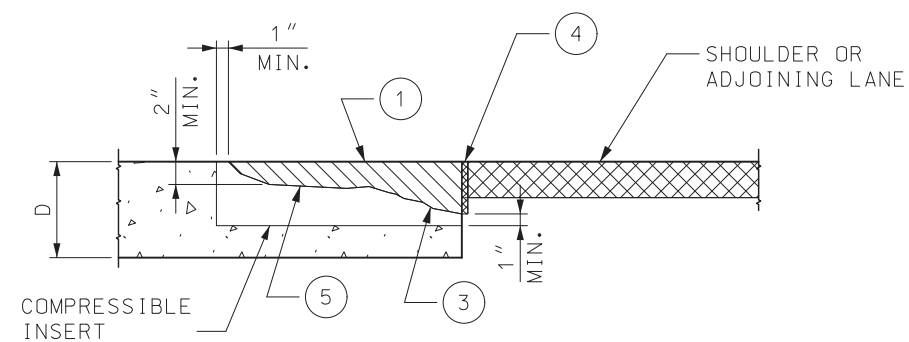
SECTION B-B



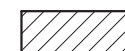
SECTION C-C



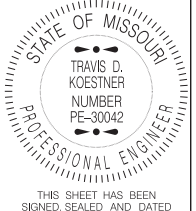
SECTION D-D



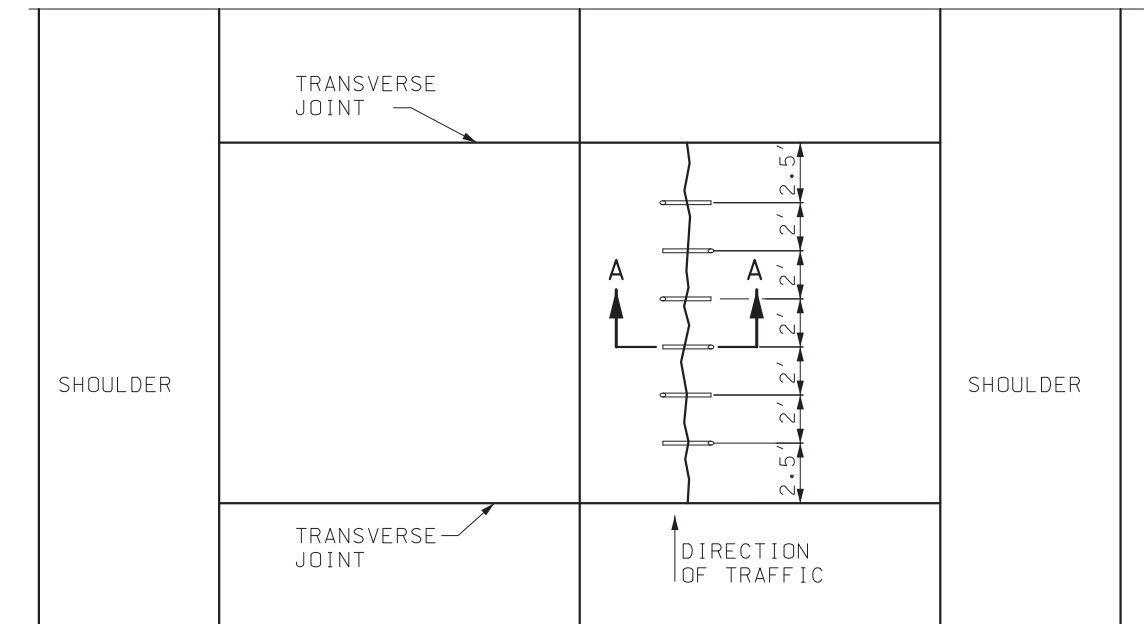
SECTION E-E

 AREA TO BE REMOVED

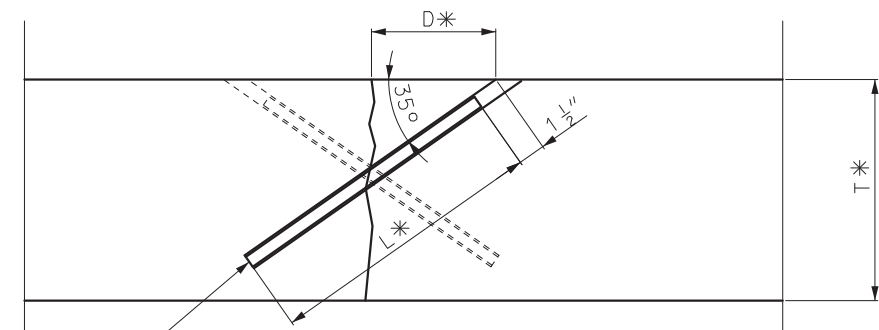
- 1 REMOVE ALL CONCRETE, TO LIMITS SHOWN, TO MAX. OF  $\frac{1}{2}$  THE PAVEMENT DEPTH OR TOP OF DOWELS BY MILLING.
- 2 PLACE COMPRESSIBLE INSERT IN JOINT OR CRACK. INSERT SHALL BE THICKNESS OF JOINT OR CRACK WIDTH, BUT NOT LESS THAN  $\frac{1}{4}$ ".
- 3 CHIP VERTICAL REPAIR EDGES AT APPROXIMATE 1:1 SLOPE.
- 4 PLACE  $\frac{1}{8}$ " MIN. COMPRESSIBLE INSERT ADJACENT TO LONGITUDINAL LANE OR SHOULDER JOINT.
- 5 EXPOSED SURFACE SHALL BE CLEANED BY SANDBLASTING OR SHOTBLASTING.
- 6 EXPOSED SURFACE OF DOWEL BARS SHALL BE COATED WITH AN APPROVED BONDBREAKER.

|                                                                                                                                                                                                                                  |                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                    |
|                                                                                                                                             | <b>PAVEMENT REPAIR</b><br>PARTIAL DEPTH<br>CLASS A |
| DATE EFFECTIVE: 01/01/2020<br>DATE PREPARED: 10/17/2019                                                                                                                                                                          | <b>613.00T</b>                                     |
| SHEET NO.<br>2 OF 4                                                                                                                                                                                                              |                                                    |





CROSS STITCHING PLAN



#6 EPOXY REBAR  
CROSS STITCH  
BAR

\* SEE TABLE

|   |                       |                               |                               |                                |                               |                               |
|---|-----------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|
| T | SLAB THICKNESS (IN)   | 8                             | 9                             | 10                             | 11                            | 12                            |
| D | DISTANCE TO HOLE (IN) | 5 <sup>3</sup> / <sub>4</sub> | 6 <sup>1</sup> / <sub>2</sub> | 7 <sup>1</sup> / <sub>4</sub>  | 8 <sup>1</sup> / <sub>2</sub> | 8 <sup>1</sup> / <sub>2</sub> |
| L | LENGTH OF BAR (IN)    | 8 <sup>1</sup> / <sub>2</sub> | 11                            | 12 <sup>1</sup> / <sub>2</sub> | 14                            | 16                            |

SECTION A-A

GENERAL NOTES:

AT EACH REPAIR LOCATION, HOLES SHALL BE DRILLED AT 35° ANGLES TO THE PAVEMENT SURFACE, PERPENDICULAR TO THE CRACK. THE DRILL BIT DIAMETER SHALL NOT EXCEED 1 <sup>1</sup>/<sub>8</sub>".

DRILLING SHALL ALTERNATE BACK AND FORTH ON EITHER SIDE OF THE LONGITUDINAL JOINT FROM HOLE TO HOLE.

DRILLED HOLES SHALL NOT PENETRATE THROUGH THE SLAB BOTTOM.

DRILLED HOLES SHALL BE CLEANED OF LOOSE DEBRIS AND DUST. EPOXY OR POLYESTER BONDING AGENTS FOR DOWELS, MEETING THE MATERIAL REQUIREMENTS OF SECTION 1039, SHALL BE INJECTED OR POURED INTO EACH HOLE. A CROSS-STITCH BAR SHALL BE INSERTED IN EACH HOLE SUCH THAT THE EPOXY MATERIAL IS EVENLY DISTRIBUTED AROUND THE BAR AND EXTRUDING FROM THE SURFACE OPENING. EACH BAR SHALL BE INSERTED FAR ENOUGH TO ALLOW 1 <sup>1</sup>/<sub>2</sub>" OF COVER AS SHOWN IN THE PROFILE DETAIL.

THE SURFACE SHALL HAVE ALL EXCESS EPOXY REMOVED AND HAVE A FLUSH FINISH.

GENERAL NOTES:



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

TRAVIS D. KOESTNER

NUMBER PE-30042

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

PAVEMENT REPAIR

CROSS STITCHING

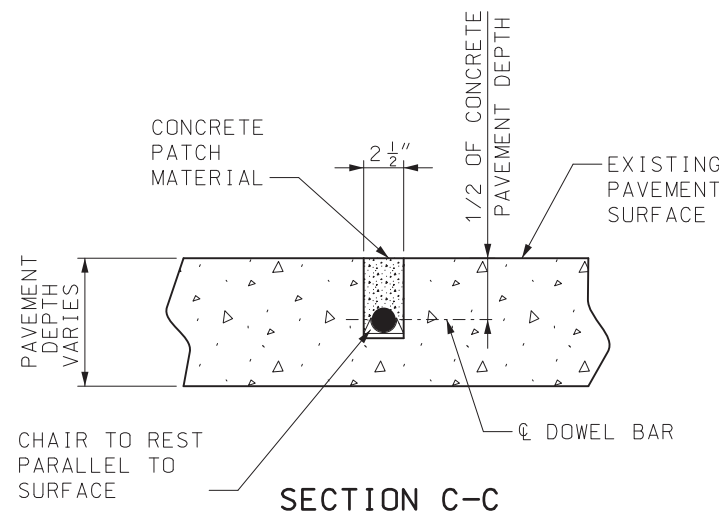
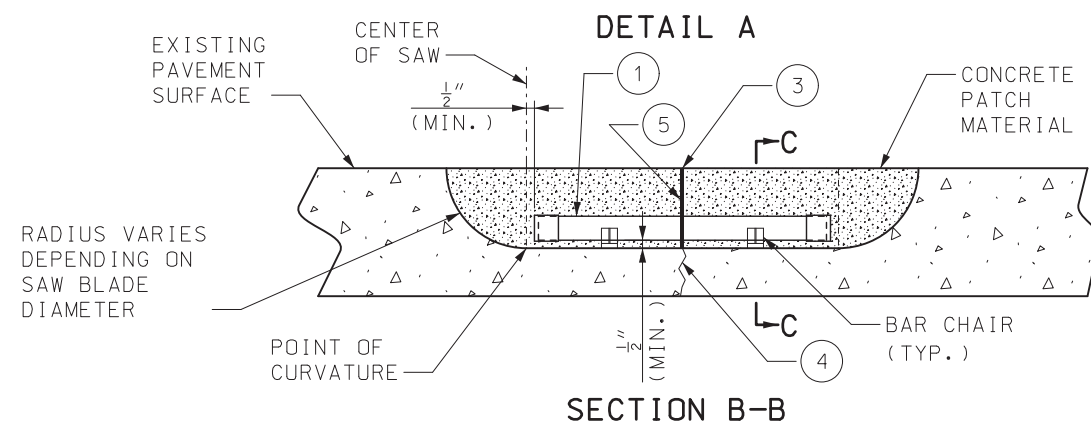
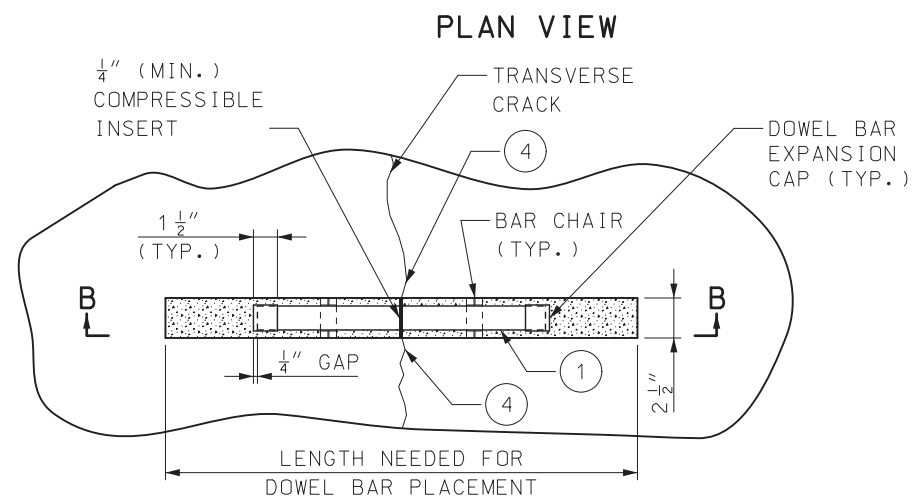
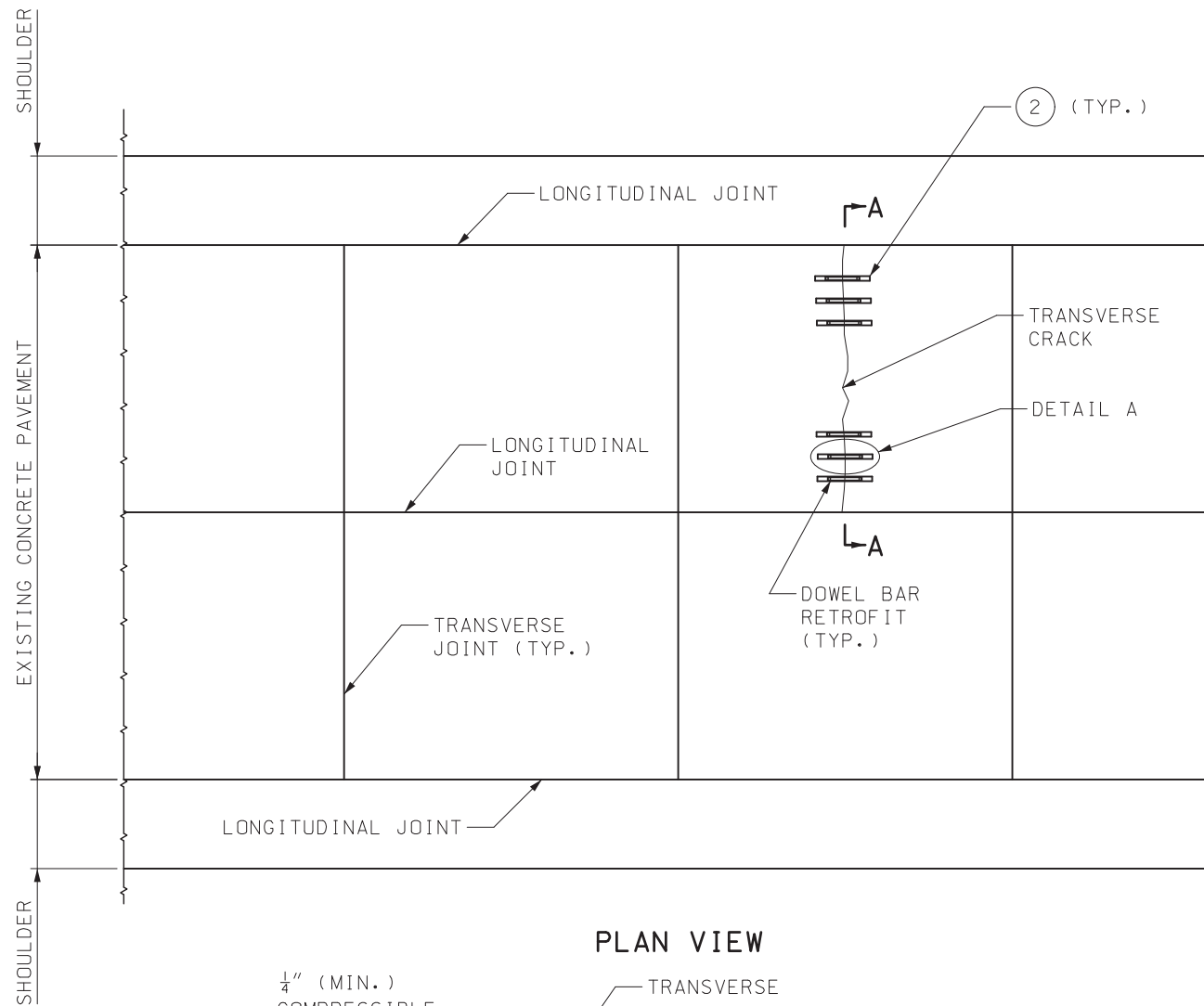
DATE EFFECTIVE: 01/01/2020

DATE PREPARED: 10/17/2019

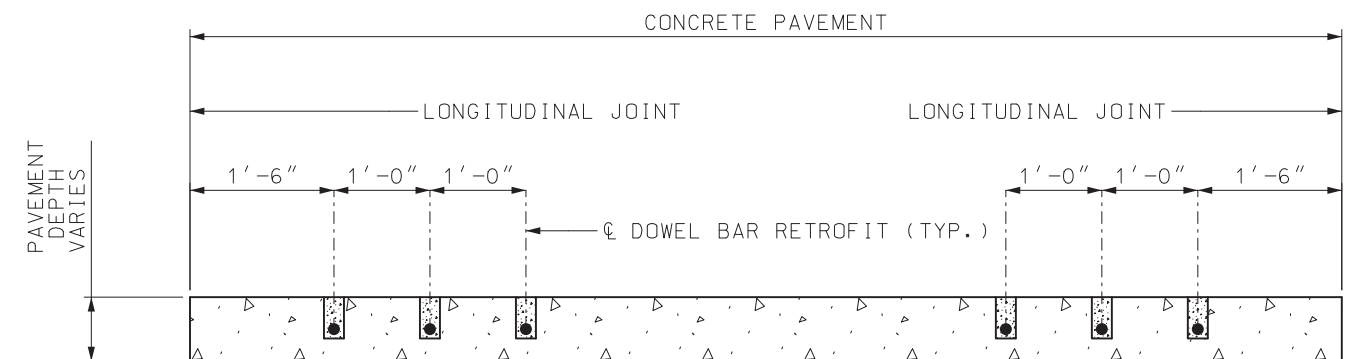
613.00T

SHEET NO.  
3 OF 4

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



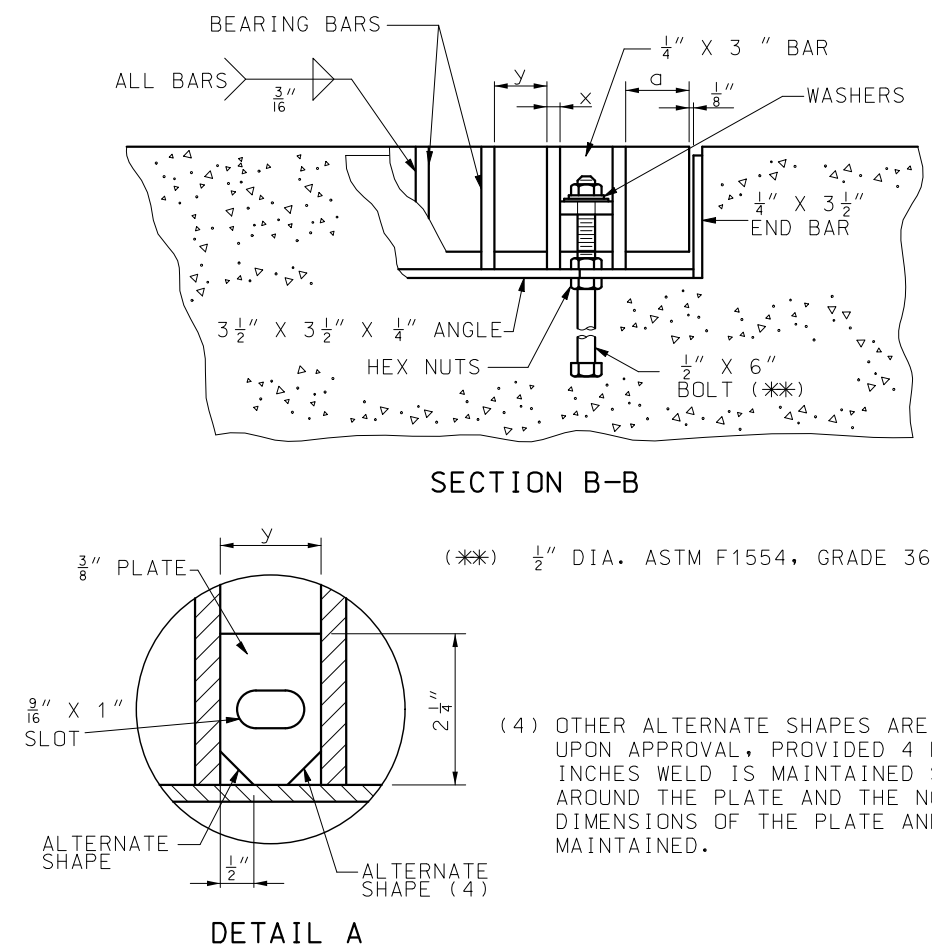
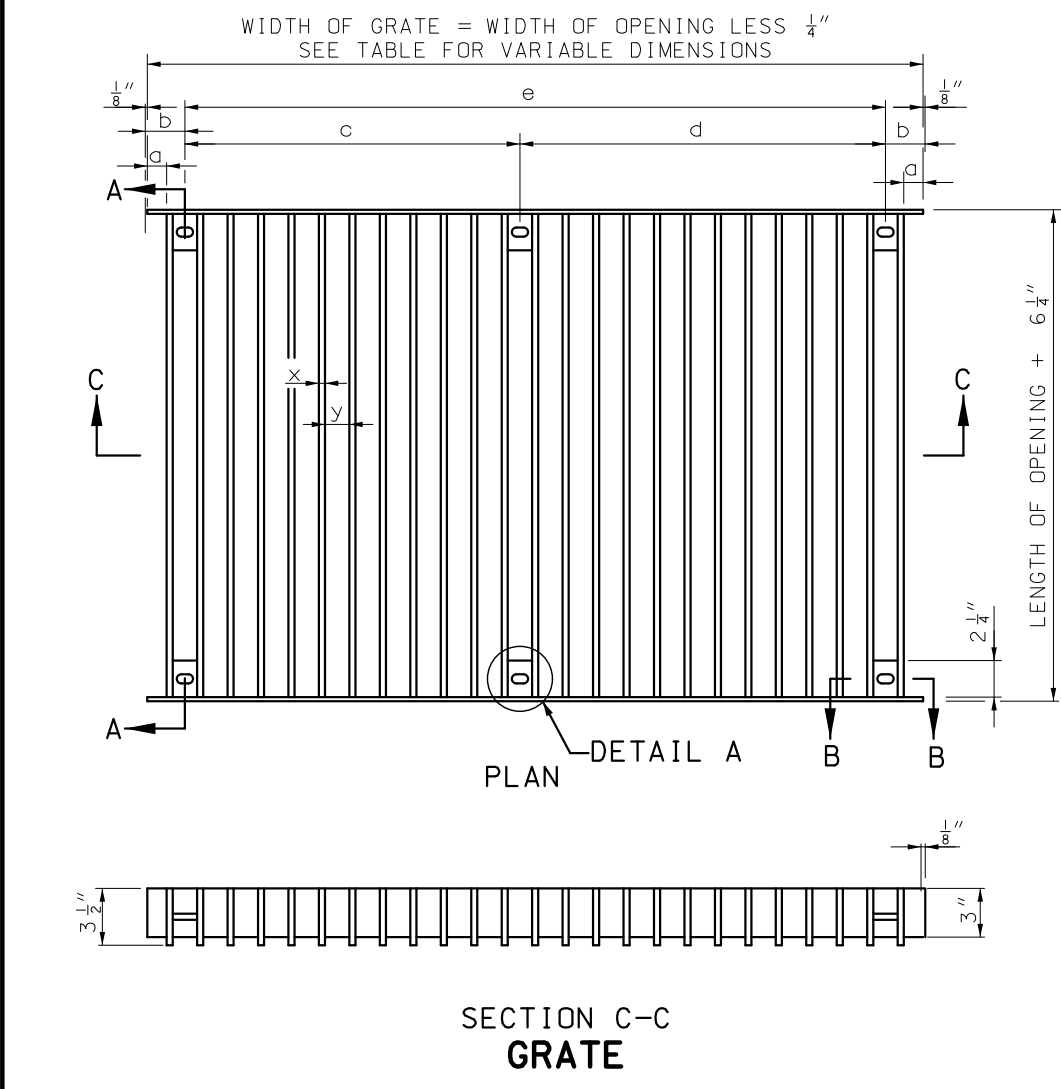
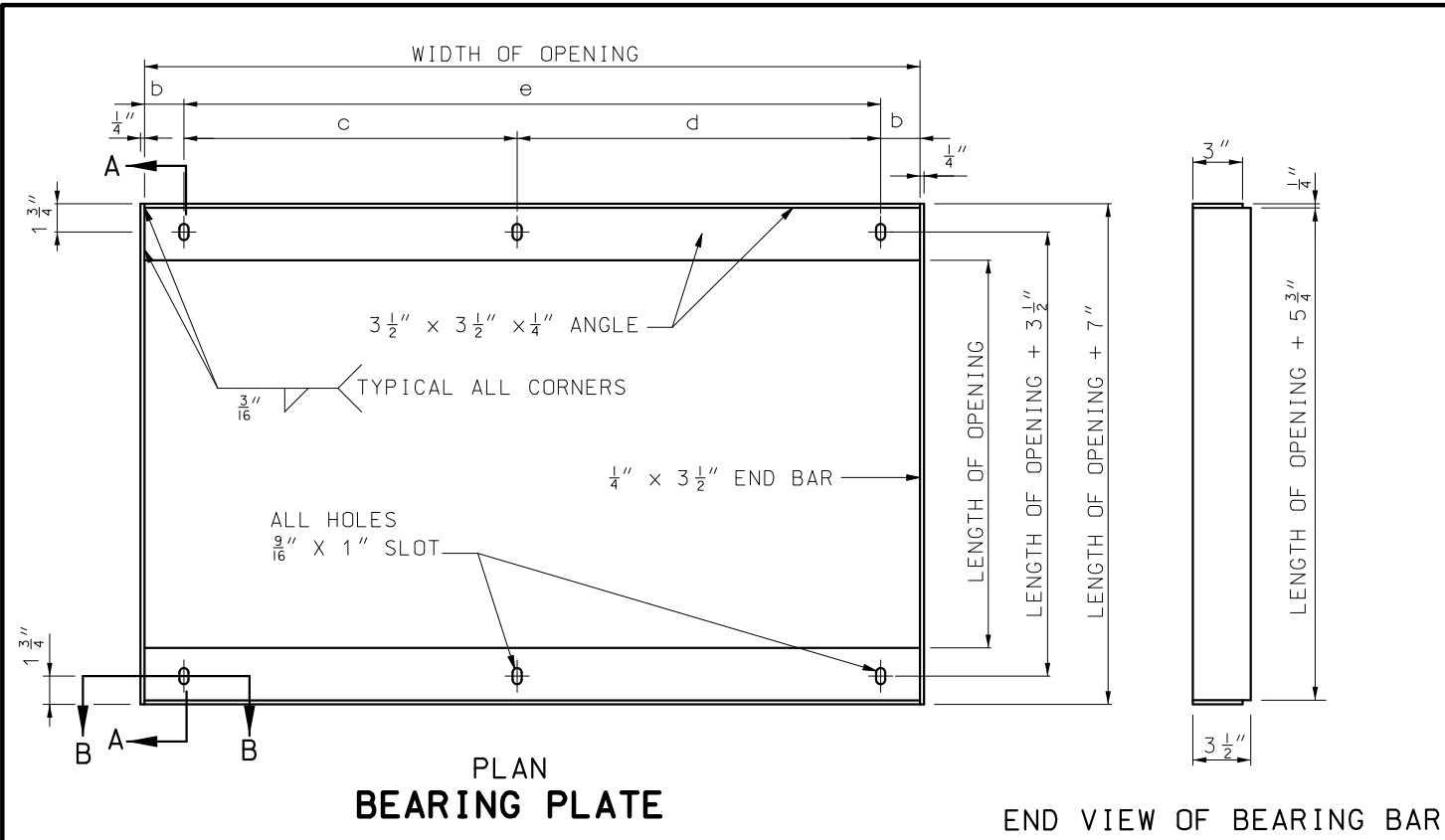
- 1 1 1/2" DIAMETER DOWEL BAR X 18" LENGTH.
- 2 DOWEL BAR SLOTS SHALL BE PARALLEL TO ROADWAY.
- 3 TOP OF COMPRESSIBLE INSERT SHALL BE FLUSH WITH PAVEMENT SURFACE.
- 4 CRACK PERIMETER IN SLOT SHALL BE SEALED WITH SILICONE.
- 5 COMPRESSIBLE INSERT SHALL BE PLACED AT MIDDLE OF DOWEL BAR.



**SECTION A-A**

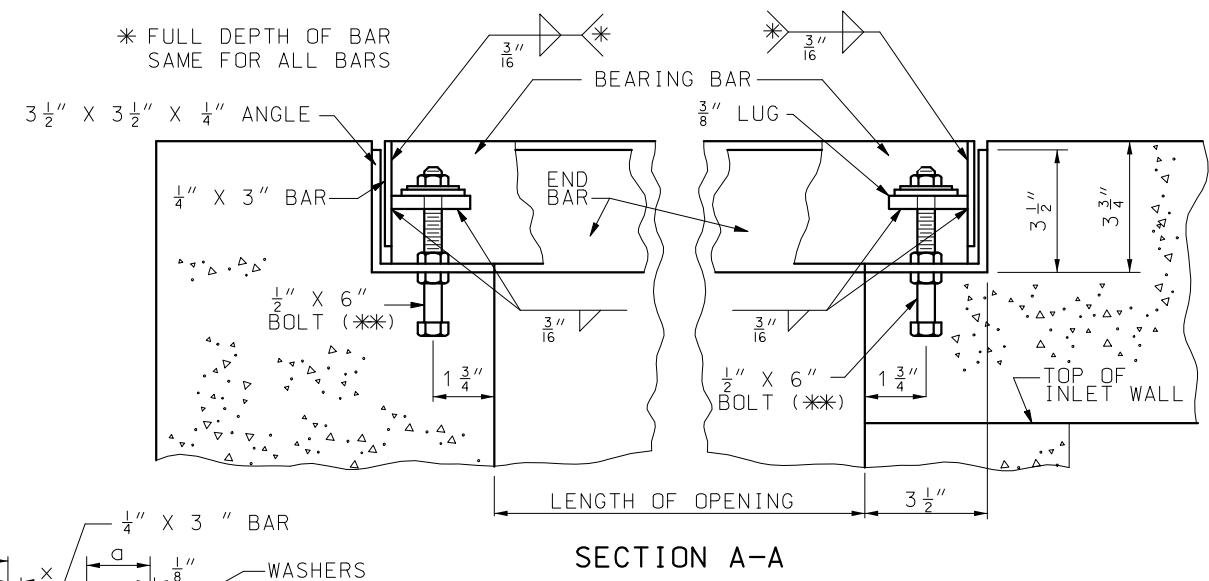
|                                                                                                                                            |                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                |
|                                                                                                                                            | <p><b>PAVEMENT REPAIR</b></p> <p><b>DOWEL BAR RETROFIT</b></p> |
| DATE EFFECTIVE: 01/01/2020<br>DATE PREPARED: 10/17/2019                                                                                    | <p><b>613.00T</b></p>                                          |
| SHEET NO. 4 OF 4                                                                                                                           |                                                                |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| WEIGHT AND DIMENSIONS DATA |        |                       |                |    |                     |        |                   |                    |                     |       |                     |                                                           |
|----------------------------|--------|-----------------------|----------------|----|---------------------|--------|-------------------|--------------------|---------------------|-------|---------------------|-----------------------------------------------------------|
| OPENING                    |        | WEIGHT<br>(1)<br>LBS. | BEARING BARS   |    |                     |        | DIMENSIONS        |                    |                     |       |                     | REMARKS                                                   |
| WIDTH                      | LENGTH |                       | x              | y  | LENGTH              | NUMBER | a                 | b                  | c                   | d     | e                   |                                                           |
| 3'-0"                      | 2'-0"  | 190                   | $\frac{3}{8}"$ | 3" | 2'-5 $\frac{3}{4}"$ | 11     | $\frac{13}{16}"$  | 2 $\frac{13}{16}"$ |                     |       | 2'-6 $\frac{3}{8}"$ | USE WITH<br>TYPE S-1<br>INLETS AND<br>TYPE S<br>HEADWALLS |
| 3'-0"                      | 3'-0"  | 330                   | $\frac{5}{8}"$ | 3" | 3'-5 $\frac{3}{4}"$ | 10     | 1 $\frac{1}{4}"$  | 3 $\frac{1}{2}"$   |                     |       | 2'-5"               |                                                           |
| 5'-0"                      | 2'-0"  | 300                   | $\frac{3}{8}"$ | 3" | 2'-5 $\frac{3}{4}"$ | 18     | 1"                | 3"                 | 2'-3"               | 2'-3" |                     |                                                           |
| 5'-0"                      | 3'-0"  | 550                   | $\frac{5}{8}"$ | 3" | 3'-5 $\frac{3}{4}"$ | 17     | $\frac{9}{16}"$   | 2 $\frac{13}{16}"$ | 2'-1 $\frac{3}{8}"$ | 2'-5" |                     |                                                           |
| 3'-1"                      | 2'-1"  | 200                   | $\frac{3}{8}"$ | 3" | 2'-6 $\frac{3}{4}"$ | 11     | 1 $\frac{5}{16}"$ | 3 $\frac{5}{16}"$  |                     |       | 2'-6 $\frac{3}{8}"$ | USE WITH<br>TYPE S-2<br>AND TYPE S-3<br>INLETS ONLY       |
| 3'-1"                      | 3'-1"  | 340                   | $\frac{5}{8}"$ | 3" | 3'-6 $\frac{3}{4}"$ | 10     | 1 $\frac{3}{4}"$  | 4"                 |                     |       | 2'-5"               |                                                           |
| 5'-1"                      | 2'-1"  | 310                   | $\frac{3}{8}"$ | 3" | 2'-6 $\frac{3}{4}"$ | 18     | 1 $\frac{1}{2}"$  | 3 $\frac{1}{2}"$   | 2'-3"               | 2'-3" |                     |                                                           |
| 5'-1"                      | 3'-1"  | 560                   | $\frac{5}{8}"$ | 3" | 3'-6 $\frac{3}{4}"$ | 17     | 1 $\frac{1}{16}"$ | 3 $\frac{5}{16}"$  | 2'-1 $\frac{3}{8}"$ | 2'-5" |                     |                                                           |

(1) THE WEIGHT OF THE GRATE AND BEARING PLATE INCLUDES THE BOLTS, NUTS, AND WASHERS AND SHALL BE AS SHOWN WITH A TOLERANCE OF 5 PERCENT.



GENERAL NOTES:

WHEN BOLTS ARE CUT IN THE FIELD, THREADS MUST BE CLEANED TO PERMIT THE FINAL NUT TO RUN FREELY ON THE BOLT.

THE WELDING REQUIREMENTS SHOWN ON THIS DRAWING ARE FOR PAINTED GRATES AND BEARING PLATES. IF GALVANIZED, ALL TIGHTLY CONTACTING SURFACES SHALL BE COMPLETELY SEALED, ON ALL SIDES BY WELDING, PRIOR TO GALVANIZING.

(\*\*)  $\frac{1}{2}''$  DIA. ASTM F1554, GRADE 36 ANCHOR BOLTS.

(4) OTHER ALTERNATE SHAPES ARE ALLOWED, UPON APPROVAL, PROVIDED 4 LINEAR INCHES WELD IS MAINTAINED SYMETRICALLY AROUND THE PLATE AND THE NOMINAL DIMENSIONS OF THE PLATE AND SLOT ARE MAINTAINED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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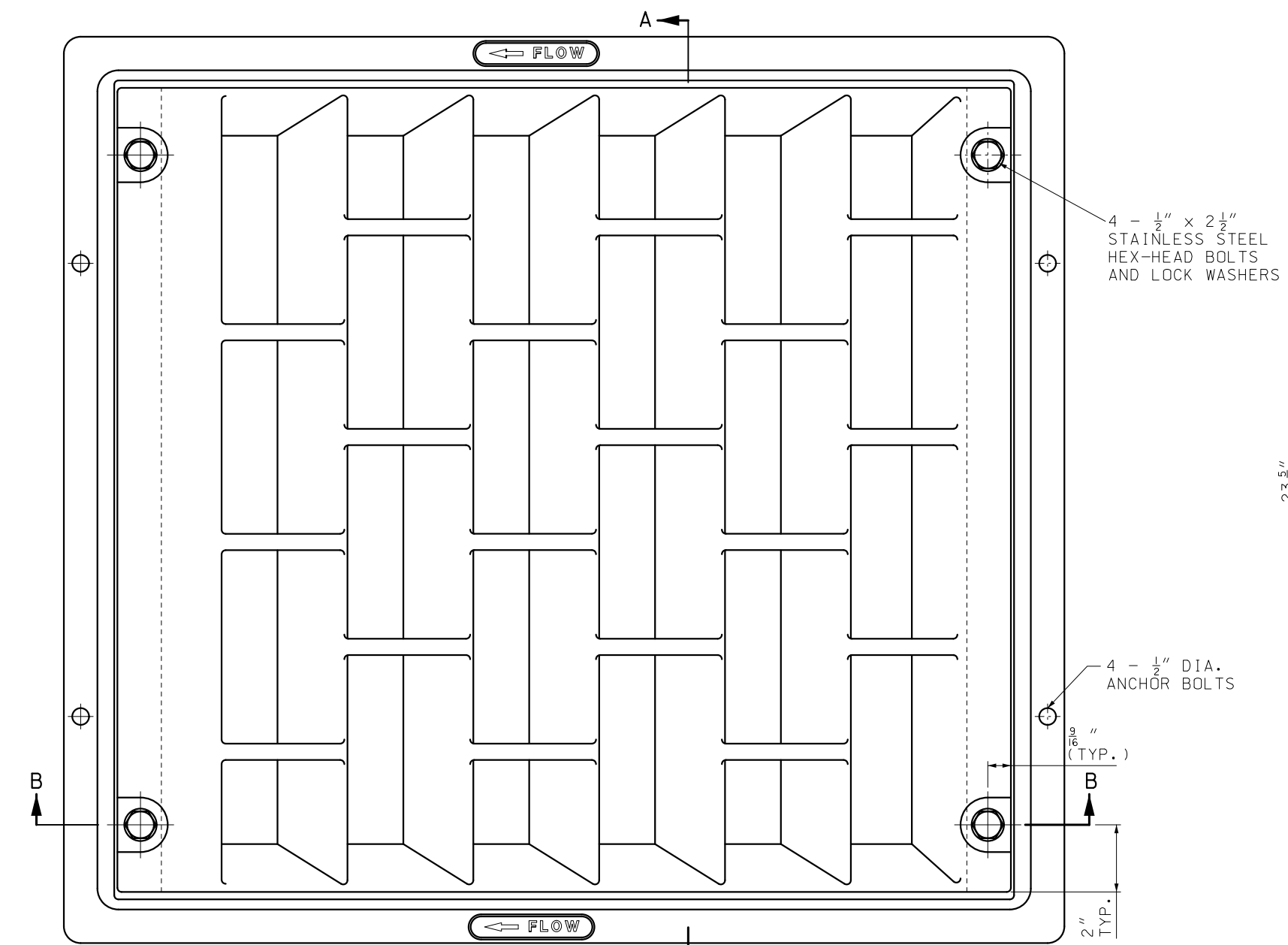
STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER  
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

**GRATES AND BEARING PLATES**

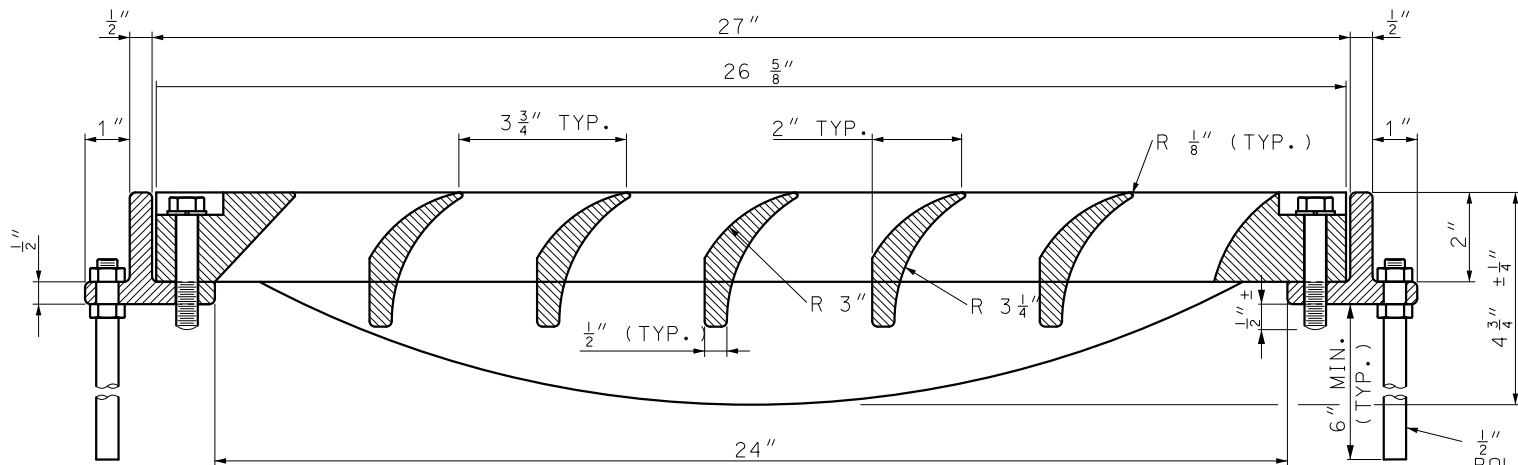
DATE EFFECTIVE: 10/01/2021  
DATE PREPARED: 7/13/2021

**614.10U**

SHEET NO.  
1 OF 1



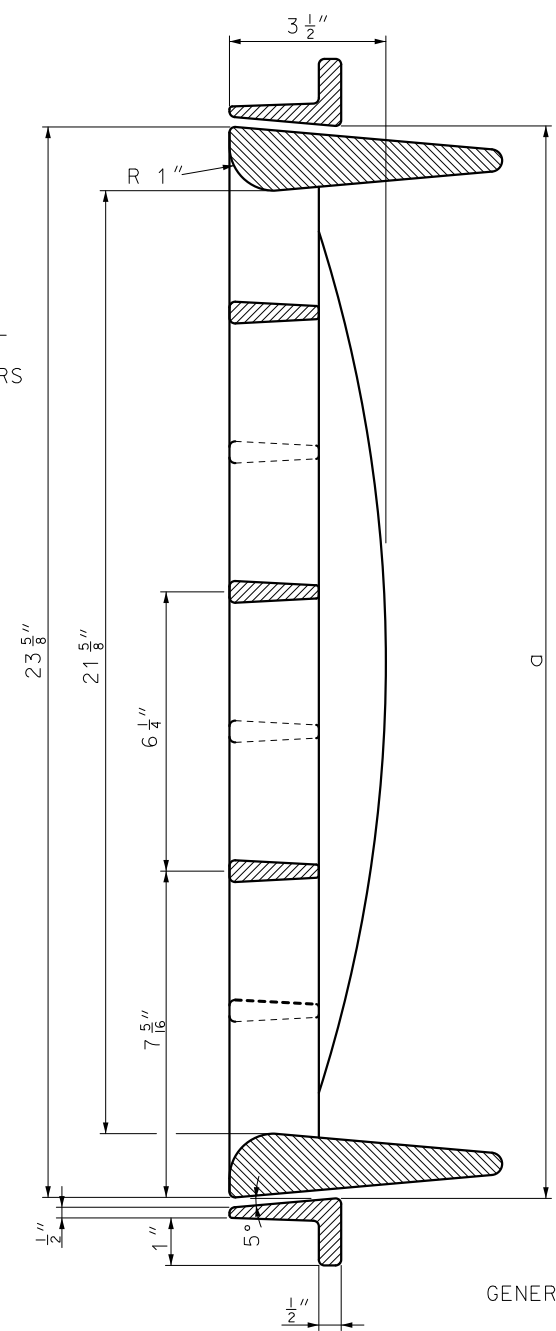
PLAN



SECTION B-B

4 - 1/2" x 2 1/2"  
STAINLESS STEEL  
HEX-HEAD BOLTS  
AND LOCK WASHERS

4 - 1/2" DIA.  
ANCHOR BOLTS



SECTION A-A

| NOMINAL<br>DIMENSIONS AND WEIGHTS |        |     |                 |                 |                          |
|-----------------------------------|--------|-----|-----------------|-----------------|--------------------------|
| OPENING                           |        | a   | WEIGHT<br>(LB.) | NUMBER OF       |                          |
| WIDTH                             | LENGTH |     |                 | ANCHOR<br>BOLTS | STAINLESS<br>STEEL BOLTS |
| 2'-0"                             | 2'-0"  | 24" | 200             | 4               | 4                        |
| 4'-0"                             | 2'-0"  | 48" | 348             | 8               | 8                        |

NOTE: TWO 2' X 2' GRATES MAY BE USED IN LIEU OF SINGLE 4' X 2' GRATES.

INSTALLATION INSTRUCTIONS:

DRILL AND TAP FRAME.

INSTALL 1/2" DIA. BOLTS WITHOUT WASHERS BEFORE CONCRETE POUR TO FORM 1/2" ± BOLT EXTENSION INTO CONCRETE BELOW FRAME. LUBRICATE EXPOSED THREADS.

AFTER CONCRETE HARDENS SUFFICIENTLY, FINAL INSTALLATION SHALL REMOVE AND REINSTALL 1/2" DIA. BOLTS AND LOCK WASHERS THROUGH GRATE AND FRAME. TORQUE 1/2" DIA. BOLTS TO 35-40 FT. LB. APPLY THREAD ADHESIVE TO ALL 1/2" DIA. STAINLESS STEEL BOLTS.

GENERAL NOTES:

GRATES TO BE CONSTRUCTED OF CAST GRAY IRON AND MEET REQUIREMENTS OF AASHTO M 306. MINOR VARIATIONS IN VANE SHAPE TO MEET MANUFACTURER'S STANDARD PRACTICE ARE PERMITTED.

MINIMUM CLEAR OPEN AREA: 2.10 SQUARE FEET.

(\*) 1/2" DIA. ASTM F1554, GRADE 36 ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M 232 (ASTM A153), CLASS C OR SHALL BE MECHANICALLY GALVANIZED. IF MECHANICALLY GALVANIZED, THE COATING THICKNESS, ADHERENCE AND QUALITY REQUIREMENTS SHALL BE IN ACCORDANCE WITH AASHTO M 232 (ASTM A153), CLASS C. DAMAGED SPALTER COATING SHALL BE REPAIRED IN ACCORDANCE WITH SEC 1081.

1/2" DIA. ANCHOR  
BOLT (TYP.)(\*)



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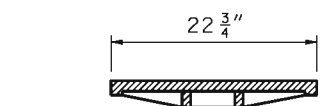


**CURVED VANE GRATE AND FRAME**

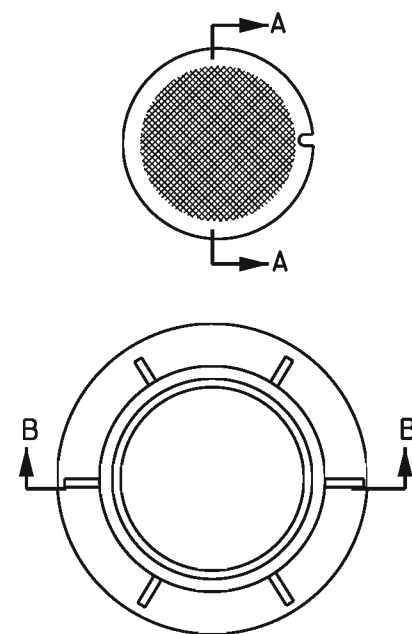
DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

**614.11D**

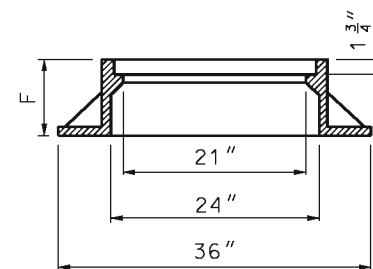
SHEET NO.  
1 OF 1



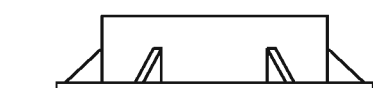
SECTION A-A



PLAN

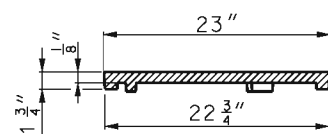


SECTION B-B

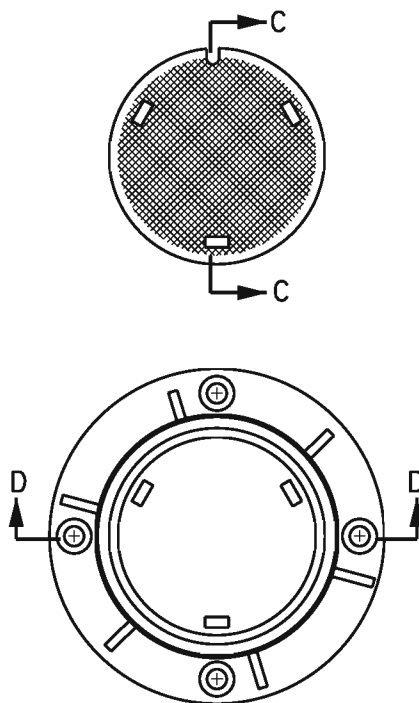


ELEVATION  
TYPE 1A AND 1B

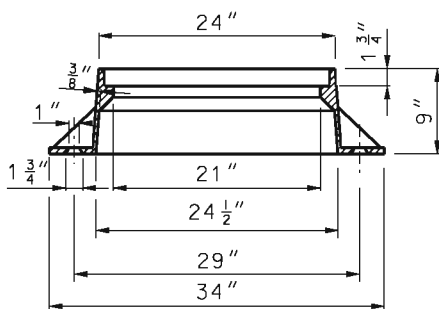
APPROXIMATE WEIGHT OF  
FRAME AND COVER  
TYPE 1A 540 LBS.  
TYPE 1B 570 LBS.



SECTION C-C



PLAN

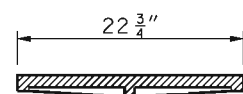


SECTION D-D

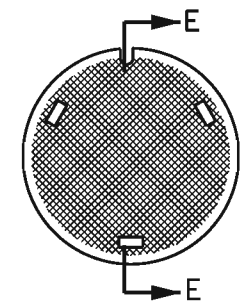


ELEVATION  
TYPE 1C

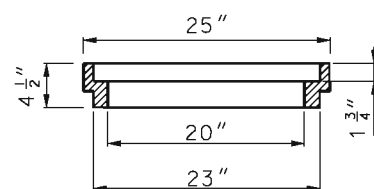
APPROXIMATE WEIGHT OF  
FRAME AND COVER 290 LBS.



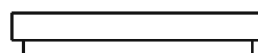
SECTION E-E



PLAN

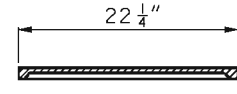


SECTION F-F

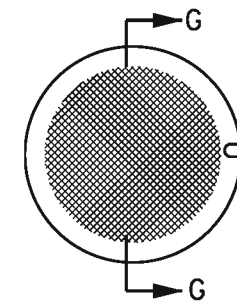


ELEVATION  
TYPE 2

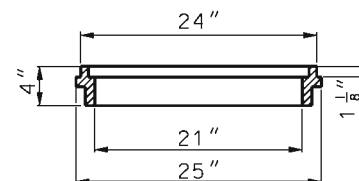
APPROXIMATE WEIGHT OF  
FRAME AND COVER 250 LBS.



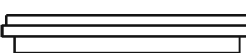
SECTION G-G



PLAN

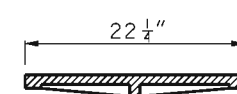


SECTION H-H

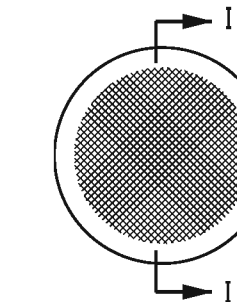


ELEVATION  
TYPE 3

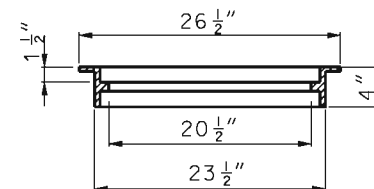
APPROXIMATE WEIGHT OF  
FRAME AND COVER 115 LBS.



SECTION I-I



PLAN



SECTION J-J



ELEVATION  
TYPE 4

APPROXIMATE WEIGHT OF  
FRAME AND COVER 160 LBS.

GENERAL NOTES:

TYPE 1A:  
WHEN "P" (PAVEMENT THICKNESS) IS 8" USE MANHOLE  
FRAME WITH 9" HEIGHT (F) APPROXIMATE WEIGHT OF  
FRAME AND COVER, 540 LBS., CLASS 35 CASTING.

TYPE 1B:  
WHEN "P" (PAVEMENT THICKNESS) IS 9" OR 10", USE  
MANHOLE FRAME WITH 10" HEIGHT (F) APPROXIMATE  
WEIGHT OF FRAME AND COVER, 570 LBS., CLASS 35  
CASTING.

TYPE 1C:  
TYPE 1C MANHOLE FRAME AND COVER WILL BE ACCEPTED AS  
AN ALTERNATE TO TYPE 1A OR TYPE 1B. APPROXIMATE  
WEIGHT OF FRAME AND COVER, 290 LBS..

FOR "P" GREATER THAN 10" ADJUSTING RINGS COMBINED  
WITH MANHOLE FRAMES WITH "F" EQUAL TO 9" OR 10"  
SHALL BE USED TO MATCH THE PAVEMENT THICKNESS.

THE PRICE BID FOR MANHOLE FRAME AND COVER SHALL  
INCLUDE THE NUMBER OF ADJUSTING RINGS REQUIRED TO  
MATCH PAVEMENT THICKNESS.

WHEN SPECIFIED, USE A LOCK TYPE FRAME AND COVER  
WITH A MINIMUM OF 3 LOCK BLOCKS AND BOLTS.

MANHOLE ADJUSTING RINGS SHALL BE SECURED TO EITHER  
THE FRAME OR PAVEMENT TO PREVENT MOVEMENT UNDER  
TRAFFIC.

A CHECKERED DESIGN TOP SHALL BE FURNISHED.



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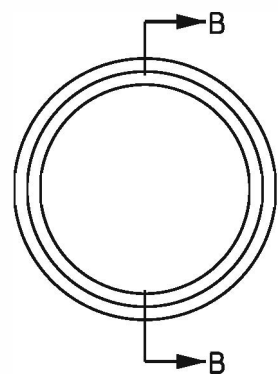
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

MANHOLE  
FRAMES AND COVERS

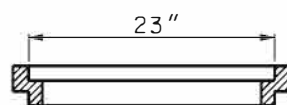
DATE EFFECTIVE: 03/01/1996  
DATE PREPARED: 8/21/2009

614.30E

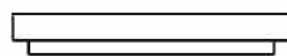
SHEET NO.  
1 OF 2



PLAN

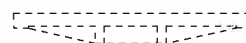


SECTION B-B



ELEVATION

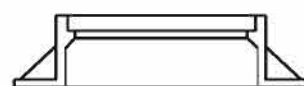
ADJUSTING RING  
SOLID OR ADJUSTABLE



COVER

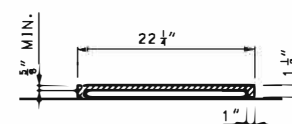


ADJUSTING RING

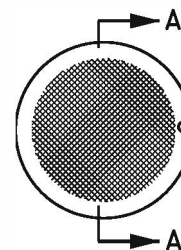


FRAME

INSTALLATION  
DETAILS

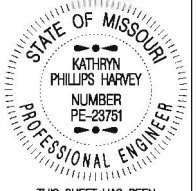


SECTION A-A

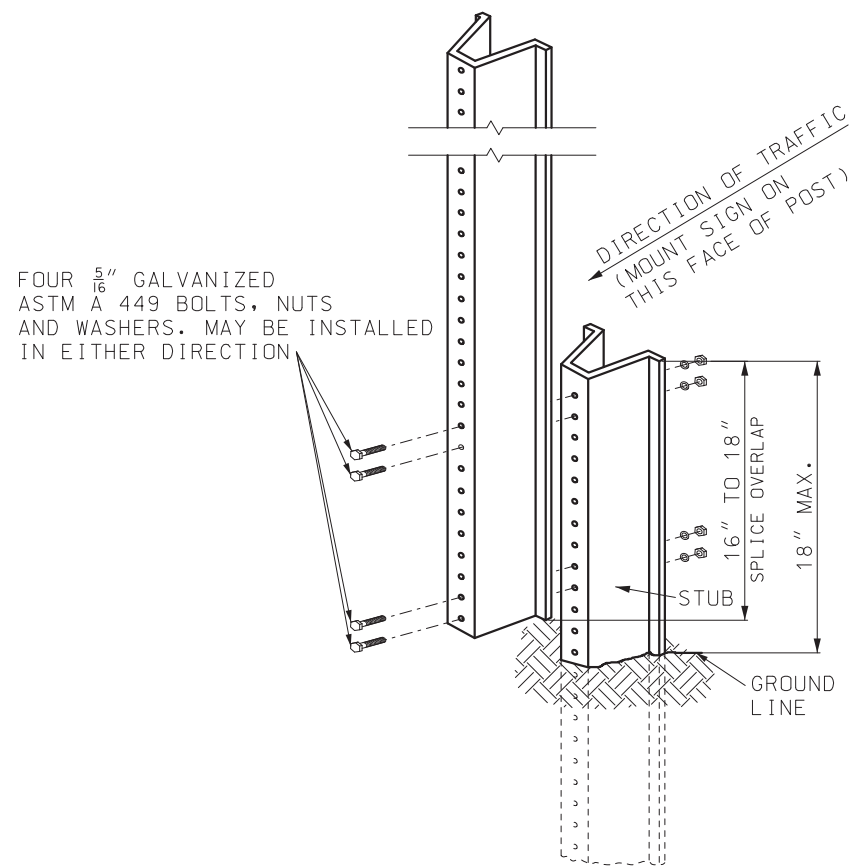


APPROXIMATE WEIGHT OF  
FRAME AND COVER 150 LBS.

ALTERNATE  
TYPE 4 COVER

|                                                                                                                                                                                                                                  |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| <br>THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY.                                                                      | <b>MANHOLE<br/>FRAMES AND COVERS</b> |
| DATE EFFECTIVE: 03/01/1996<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <b>614.30E</b>                       |
| SHEET NO.<br>2 OF 2                                                                                                                                                                                                              |                                      |



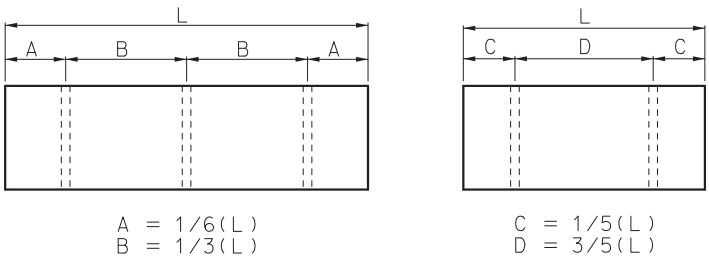


U-CHANNEL POST DETAIL

USE OF SPLICE IS OPTIONAL.

SPLICE OVERLAP SHALL BE POSITIONED ENTIRELY BETWEEN GROUND LINE AND 18" ABOVE GROUND LINE.

ONLY ONE SPLICE WILL BE ALLOWED PER POST.

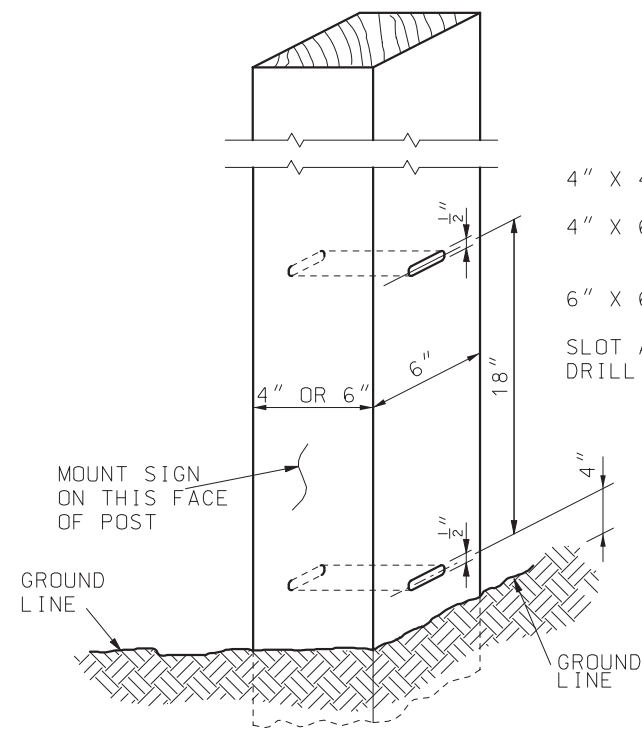


POST SPACING

| POST TYPE          |                  |                          |                                 |
|--------------------|------------------|--------------------------|---------------------------------|
| SIGN AREA (SQ.FT.) | U-CHANNEL        | WOOD                     | PERFORATED SQUARE STEEL TUBING  |
| ≤ 10               | 1 – 3.0 LB./FT.* | 1 – 4" X 4"*             | 1 – 2" 12 GA.*                  |
| > 10 ≤ 16          | 2 – 3.0 LB./FT.  | 2 – 4" X 4" 1 – 4" X 6"* | 2 – 2" 12 GA. 1 – 2 1/2" 12 GA. |
| > 16 ≤ 24          | 2 – 3.0 LB./FT.  | 2 – 4" X 6"              | 3 – 2" 12 GA.**                 |
| > 24 ≤ 32          | 3 – 3.0 LB./FT.  | 2 – 4" X 6"              | N/A                             |
| > 30 ≤ 50          | N/A              | 2 – 6" X 6"              | N/A                             |

\* SIGNS GREATER THAN 4 FEET IN WIDTH, EXCEPT DIAMOND SHAPE SIGNS, REQUIRE TWO POSTS.

\*\* REQUIRES SLIP BASE PER MANUFACTURER’S RECOMMENDATION.



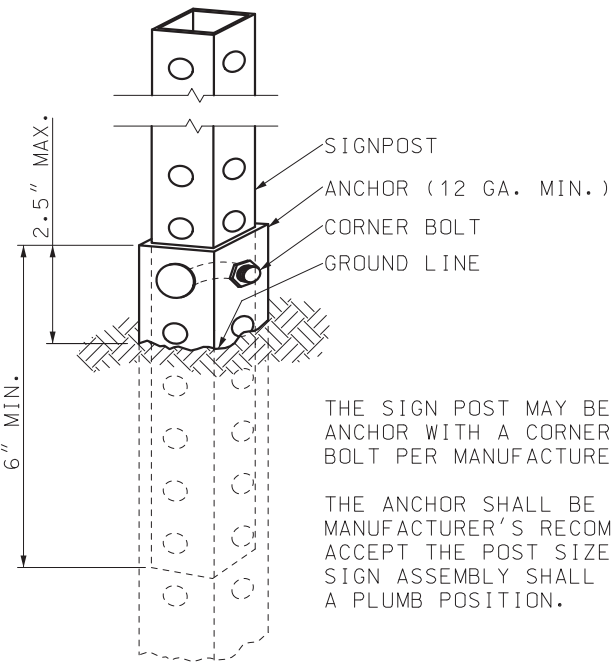
WOOD POST DETAIL

4" X 4" WOOD POST – NO SLOTS OR HOLES REQUIRED

4" X 6" WOOD POST – 1 1/2" X 1/2" SLOT ON 6" SIDE OR 1 1/2" DIA. HOLE ON 6" SIDE

6" X 6" WOOD POST – 2" X 1/2" SLOT OR 2" DIA. HOLE

SLOT ACROSS NEUTRAL AXIS FORMED BY SUCCESSIVE DRILLING WITH 1/2" BIT.



PERFORATED SQUARE STEEL TUBE POST DETAIL

THE SIGN POST MAY BE ATTACHED TO THE ANCHOR WITH A CORNER BOLT OR STRAIGHT BOLT PER MANUFACTURER’S SPECIFICATION.

THE ANCHOR SHALL BE SIZED AS PER MANUFACTURER’S RECOMMENDATIONS TO ACCEPT THE POST SIZE SPECIFIED. THE SIGN ASSEMBLY SHALL BE MAINTAINED IN A PLUMB POSITION.

GENERAL NOTES:

ALL POSTS SHALL BE EMBEDDED A MINIMUM OF 3 FEET.

SIGN INSTALLATION DETAILS SHOWN SHALL APPLY TO ALL POSTS IN A MULTI-POST INSTALLATION.

AT THE ENGINEERS DISCRETION A FLUORESCENT PAINT SHALL BE APPLIED HEAVILY TO BOTH SIDES OF U-CHANNEL POST STUB FOR A LENGTH OF AT LEAST 6 INCHES BELOW THE TOP OF THE STUB.



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TEMPORARY TRAFFIC CONTROL DEVICES POST INSTALLATION DETAILS

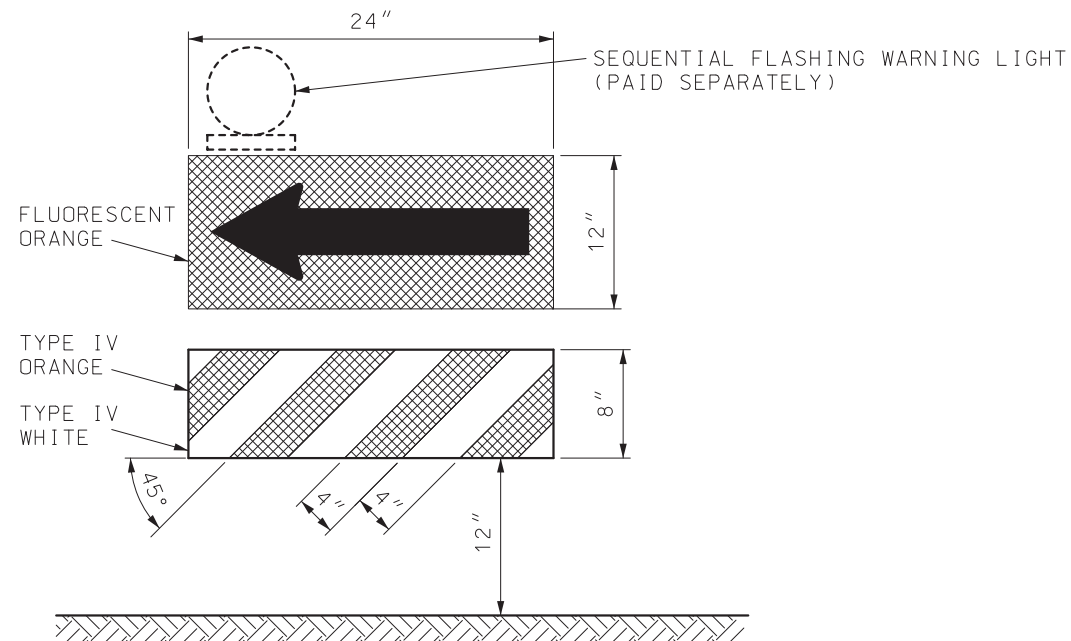
DATE EFFECTIVE: 7/1/2025

DATE PREPARED: 3/11/2025

616.10BF

SHEET NO. 2 OF 9





## DIRECTION INDICATOR BARRICADE

VERTICAL DIMENSIONS DO NOT INCLUDE PROJECTIONS DESIGNED FOR EASE OF HANDLING.

DIRECTION INDICATOR BARRICADES SHALL NOT BE USED IN SHIFTING TAPERS UNLESS SHOWN ON THE PLANS.

THE PANELS SHALL BE SECURELY ATTACHED TO A SUPPORT THAT IS PORTABLE, CAPABLE OF REMAINING UPRIGHT AND ENTIRELY FREE STANDING.

### GENERAL NOTES:

WHITE, ORANGE, AND FLUORESCENT ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC 1042.2.7.

BALLAST FOR TRAFFIC CONTROL DEVICES SHALL CONFORM TO MANUFACTURERS' RECOMMENDATION FOR FIELD CONDITIONS WHEN APPLICABLE.

SEQUENTIAL FLASHING WARNING LIGHTS SHALL BE IN ACCORDANCE WITH SEC 1063.5.

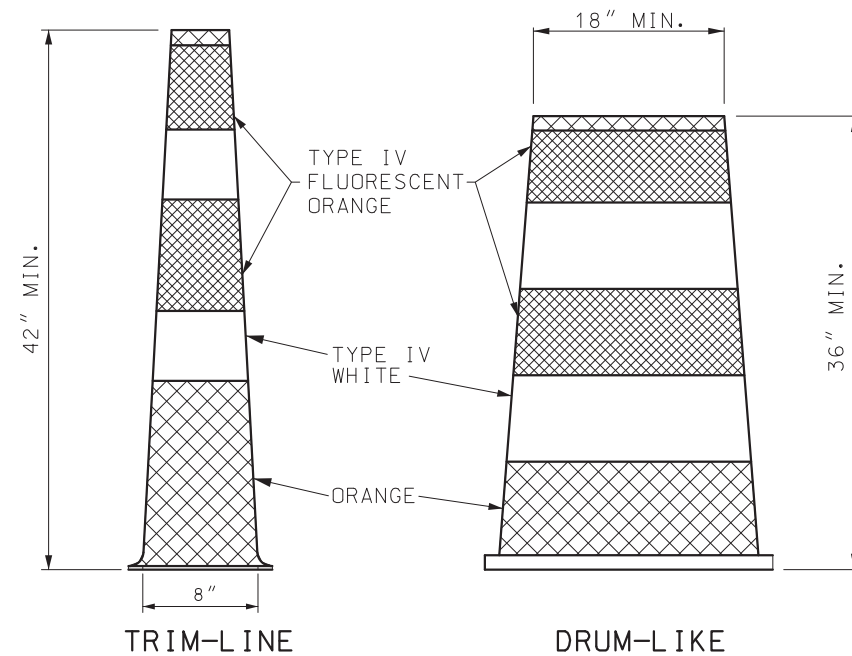
UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE DRUM-LIKE CHANNELIZERS IN LIEU OF TRIM-LINE CHANNELIZERS TO PROVIDE LONGITUDINAL CHANNELIZATION WITHIN THE ACTIVITY AREA WHERE NO RAMPS, INTERSECTIONS OR LIMITED LATERAL CLEARANCE EXISTS.

UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE DIRECTION INDICATOR BARRICADES IN LIEU OF TRIM-LINE CHANNELIZERS IN MERGING TAPERS.

UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE VERTICAL PANELS IN LIEU OF TRIM-LINE CHANNELIZERS TO PROVIDE LONGITUDINAL CHANNELIZATION WITHIN THE ACTIVITY AREA.

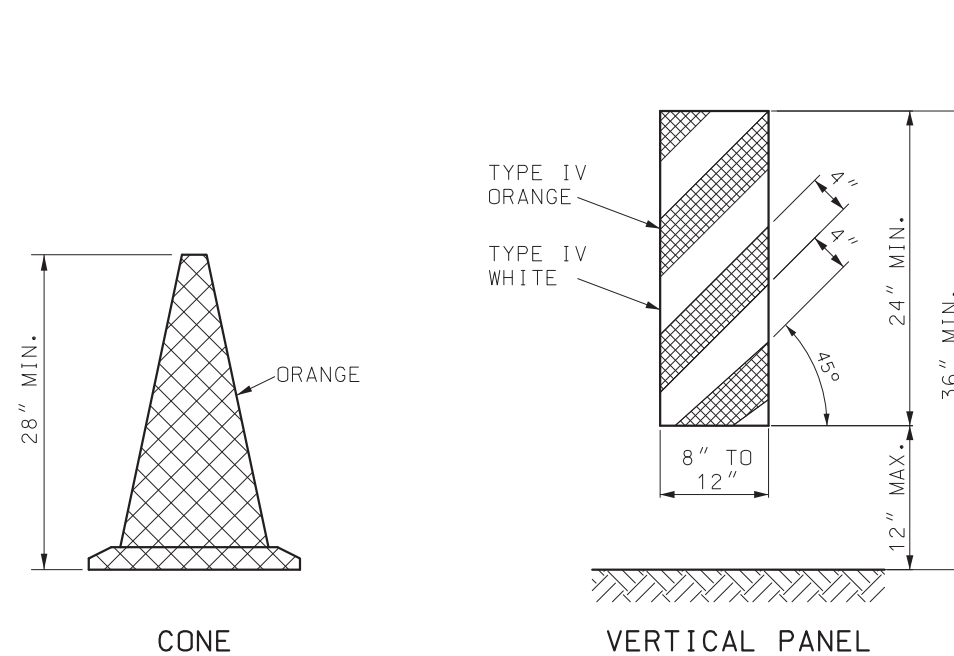
UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, USE CONES IN LIEU OF TRIM-LINE CHANNELIZERS DURING DAYTIME OPERATIONS ON MINOR ROUTES.

PANEL AND RAIL MARKINGS FOR TRAFFIC DELINEATION SHALL SLOPE DOWNWARD TOWARD THE INTENDED DIRECTION OF TRAVEL. ILLUSTRATIONS SHOWN ARE FOR INSTANCES WHERE TRAFFIC MOVES TO THE LEFT. REVERSE CONFIGURATIONS SHALL BE USED FOR TRAFFIC MOVEMENTS TO THE RIGHT. MARKINGS SHALL ONLY BE APPLIED TO THE FRONT OF EACH RAIL OR PANEL, OR MAY BE APPLIED TO BOTH THE FRONT AND BACK PROVIDING THE MARKING ON THE BACK DOES NOT CONFLICT WITH INTENDED OPPOSING TRAFFIC MOVEMENT.



STRIPES ON TRIM-LINE CHANNELIZERS SHALL BE 6" TO 8".  
STRIPES ON DRUM-LIKE CHANNELIZERS SHALL BE 4" TO 6".

WHITE AND FLUORESCENT ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC 1042.2.7.3.

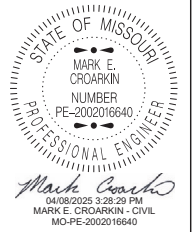


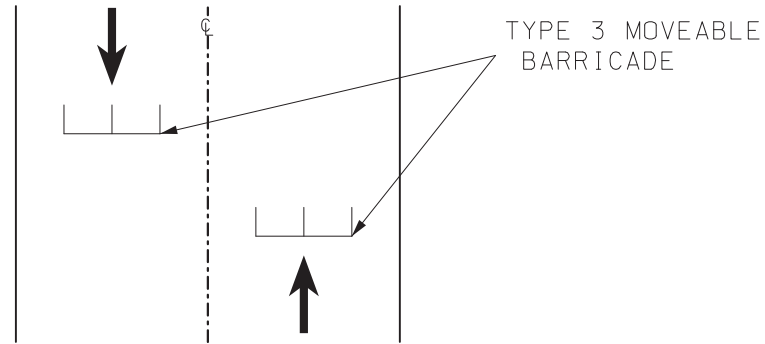
CONES SHALL MAINTAIN THEIR SHAPE UPON EXPOSURE TO NORMAL WORK CONDITIONS.

CONES SHALL BE USED DURING DAYLIGHT HOURS ONLY.

VERTICAL PANELS SHALL BE SECURELY ATTACHED TO A SUPPORT THAT IS PORTABLE, CAPABLE OF REMAINING UPRIGHT AND ENTIRELY FREE STANDING.

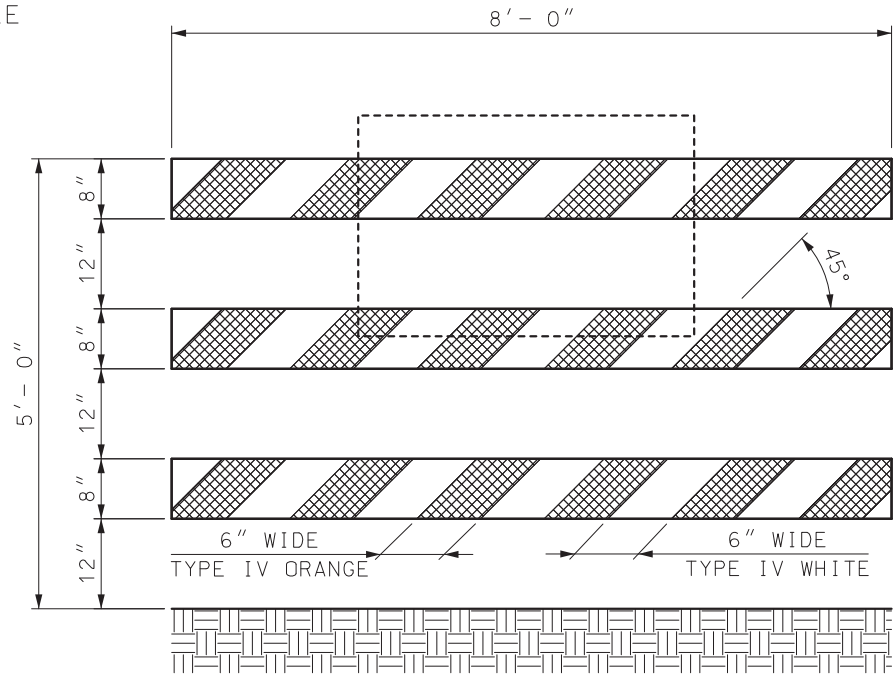
## CHANNEL IZERS

|                                                                                                                                                                                                                                  |                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                     |
| <br>04/08/2025 3:28:29 PM<br>MARK E. CROARKIN - CIVIL<br>MO-PE-2002016640                                                                   | <b>TEMPORARY<br/>TRAFFIC CONTROL DEVICES<br/>CHANNELIZERS AND DIRECTION<br/>INDICATOR BARRICADE</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025                                                                                                                                                                             | SHEET NO.<br><b>616.10BF</b><br><b>3 OF 9</b>                                                       |

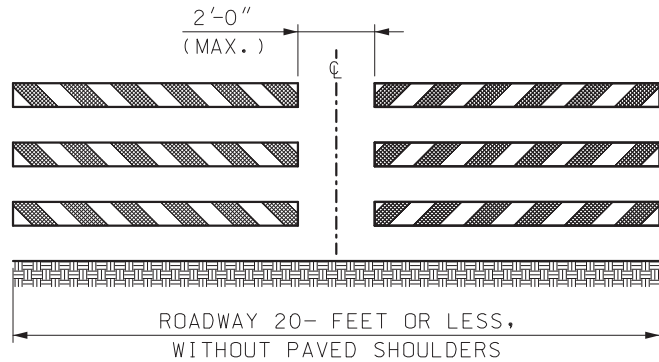


RETROREFLECTIVE MARKING ON TYPE 3 BARRICADES SHALL BE ON BOTH SIDES OF EACH RAIL AND DIRECT TRAFFIC MOVEMENT APPROPRIATELY TO ALLOW VEHICLES TO PASS THROUGH

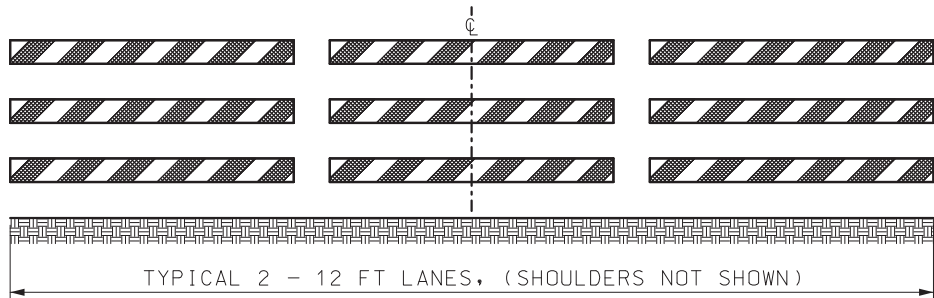
SOFT CLOSURE  
PLAN VIEW



EXAMPLE 1

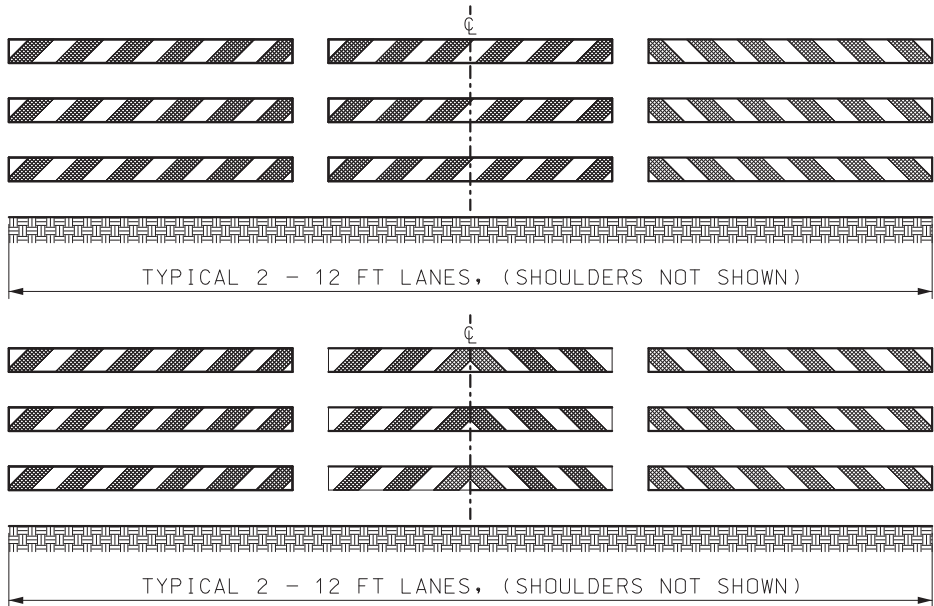


EXAMPLE 2

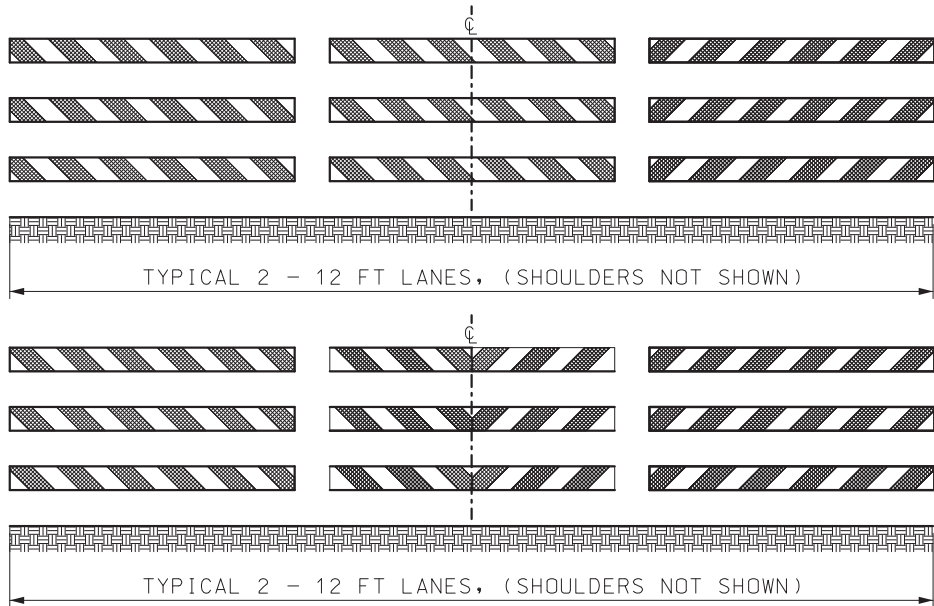


EXAMPLE SHOWS STRIPES SLOPING TO DIRECT VEHICULAR MOVEMENT TOWARD THE LEFT

EXAMPLE 3



EXAMPLE 4



EXAMPLE 5

GENERAL NOTES:

TYPE 3 MOVABLE BARRICADES SHALL BE ENTIRELY FREE STANDING AND PORTABLE. MARKING SHALL ONLY BE APPLIED TO THE FRONT OF EACH RAIL OR MAY BE APPLIED TO BOTH THE FRONT AND THE BACK OF EACH RAIL PROVIDED THE MARKING ON THE BACK DOES NOT CONFLICT WITH INTENDED OPPOSING TRAFFIC MOVEMENT.

WHITE AND ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC 1042.2.7.4.

EXAMPLE 1 – ONE TYPE 3 MOVABLE BARRICADE WILL BE REQUIRED TO COMPLETELY CLOSE EACH 8' OF PAVEMENT. PAVED SHOULDERS SHALL BE INCLUDED IN THE AREA TO BE CLOSED.

SIGNS SHALL BE LIGHT WEIGHT (ROLL-UP OR PLASTIC) AND SHOULD NOT OBSCURE MORE THAN 50 PERCENT OF THE TOP 2 RAILS OR 33 PERCENT OF ALL THREE RAILS.

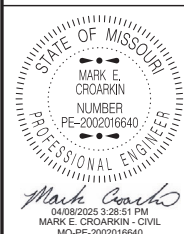
IF SIGNS CANNOT MEET THE ABOVE REQUIREMENTS, THEY SHALL BE MOUNTED ON SEPARATE CRASHWORTHY DEVICES AT HEIGHTS SPECIFIED FOR POST MOUNTED SIGNS, LOCATED IN TABLE A ON SHEET 1. THE BARRICADE SHALL BE LOCATED IN FRONT OF THE SIGNS WITH 7 TO 10 FEET SEPARATING THE DEVICES.

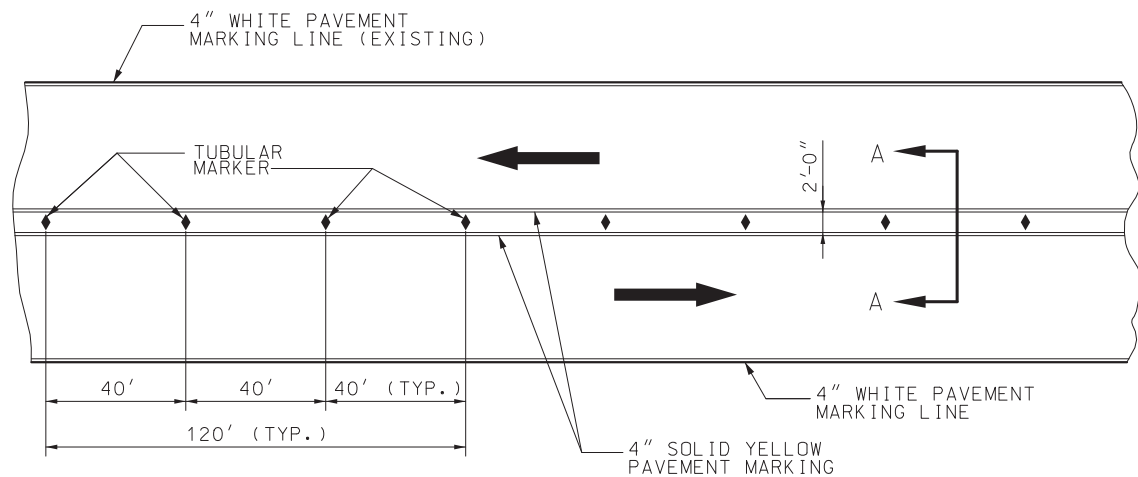
EXAMPLE 2 – FOR PAVED ROADWAYS WITH A WIDTH OF 20- FEET OR LESS AND WITHOUT PAVED SHOULDERS, TWO BARRICADES ARE ACCEPTABLE.

EXAMPLE 3 – WHERE BARRICADES EXTEND ENTIRELY ACROSS A ROADWAY, STRIPES SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH ROAD USERS MUST TURN.

EXAMPLE 4 – WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED, STRIPES SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE OR BARRICADES.

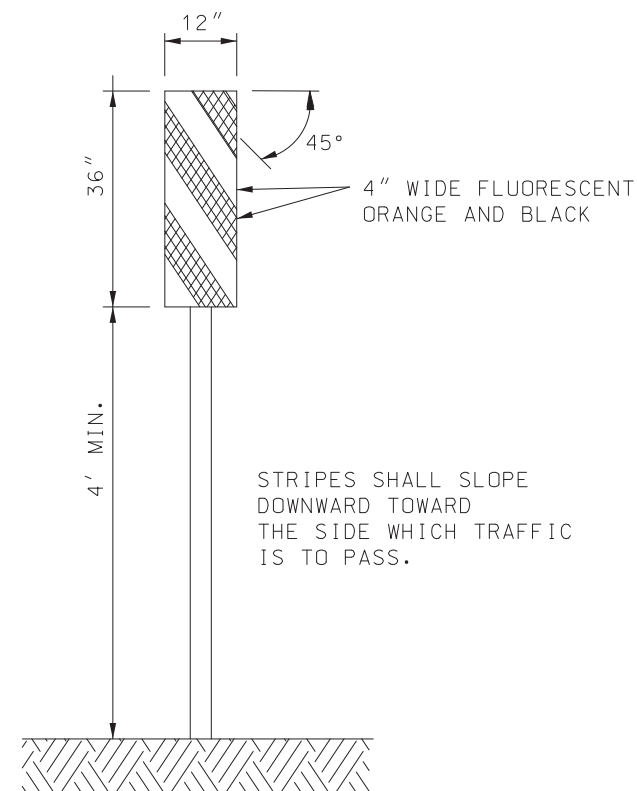
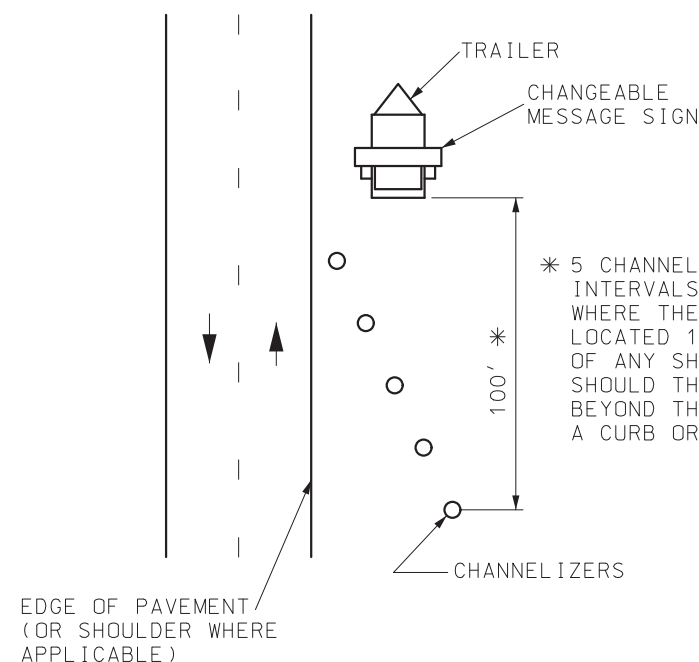
EXAMPLE 5 – WHERE NO TURNS ARE INTENDED, STRIPES POSITIONED TO SLOPE DOWNWARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES.

|                                                                                                                                                                                                                                  |                                                                             |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                             |          |
| <br>Mark E. Chorkin<br>04/08/2025 3:28:51 PM<br>MARK E. CHORKIN - CIVIL<br>MO-PE-2002016640                                                 | <b>TEMPORARY TRAFFIC CONTROL DEVICES</b><br><b>TYPE 3 MOVABLE BARRICADE</b> |          |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025                        | 616.10BF |

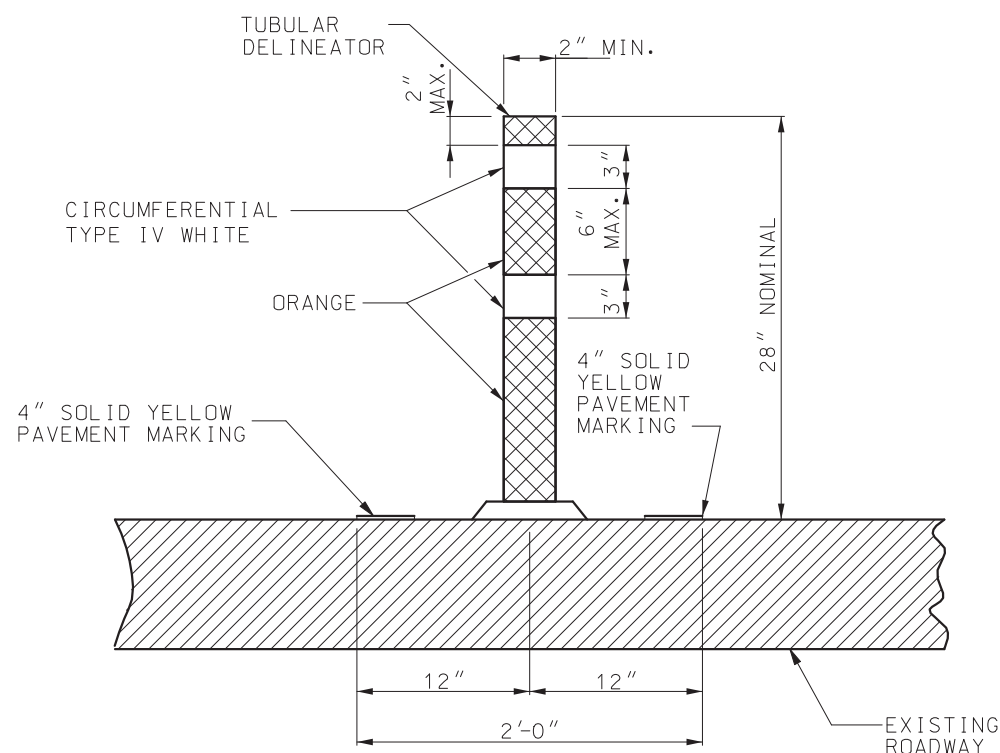


## TWO LANE / TWO WAY TRAFFIC DELINEATION PLAN FOR DIVIDED HIGHWAY

IF RAISED PAVEMENT MARKERS ARE PRESENT, THE LENSES SHALL BE REMOVED OR COVERED TO THE SATISFACTION OF THE ENGINEER.



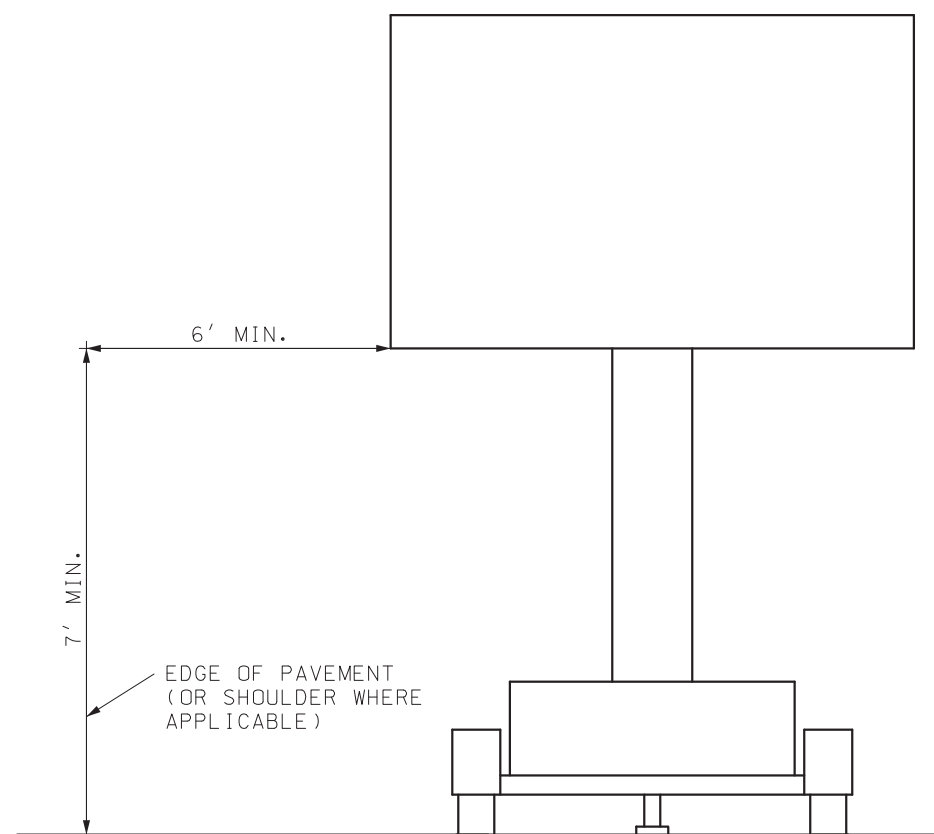
**TYPE 3 OBJECT MARKERS**  
FLUORESCENT ORANGE REFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC 1042.2.7.



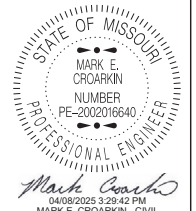
**SECTION A-A  
TUBULAR DELINEATOR DETAIL**

AN ADHESIVE, IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, SHALL BE USED TO APPLY THE TUBULAR DELINEATOR TO THE ROADWAY SURFACE. THE ADHESIVE SHALL PERMIT EASY REMOVAL OF THE TUBULAR DELINEATOR WITHOUT DAMAGE TO THE ROADWAY SURFACE.

REFLECTIVE SHEETING APPLIED TO TUBULAR DELINEATORS SHALL BE IN ACCORDANCE WITH SEC 1042.2.7.5.



**CHANGEABLE MESSAGE SIGN**

|                                                                                                                                                                                                                                  |                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                              |
|                                                                                                                                             | <b>TEMPORARY<br/>TRAFFIC CONTROL DEVICES</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025                                                                                                                                                                             | <b>616.10BF</b>                              |
| SHEET NO. 5 OF 9                                                                                                                                                                                                                 |                                              |





| SIGN                | SIZE<br>(IN.) | AREA<br>(SQ. FT.) | SHEETING     | COLOR                |                 | DESIGNATION<br>(6) | DESCRIPTION                                           |
|---------------------|---------------|-------------------|--------------|----------------------|-----------------|--------------------|-------------------------------------------------------|
|                     |               |                   |              | SYM.<br>LEG.<br>BRD. | BACK-<br>GROUND |                    |                                                       |
| WARNING SIGNS CONT. |               |                   |              |                      |                 |                    |                                                       |
| W020-5a             | 48X48         | 16.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | 2 RIGHT/CENTER/LEFT LANES CLOSED AHEAD (4)            |
| W020-6a             | 48X48         | 16.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | RIGHT/CENTER/LEFT LANE CLOSED (3)(4)                  |
| W020-7              | 48X48         | 16.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | FLAGGER (SYMBOL)                                      |
| W021-5              | 48X48         | 16.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | SHOULDER WORK / SHOULDER WORK AHEAD (3)               |
| W021-5a             | 48X48         | 16.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | RIGHT/LEFT SHOULDER CLOSED (4)                        |
| W021-5b             | 48X48         | 16.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | RIGHT/LEFT SHOULDER CLOSED AHEAD (4)                  |
| W022-1              | 48X48         | 16.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | BLASTING ZONE AHEAD                                   |
| W022-2              | 42X36         | 10.50             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | TURN OFF 2-WAY RADIO AND PHONE                        |
| W022-3              | 42X36         | 10.50             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | END BLASTING ZONE                                     |
| G022-1              | 15X21         | 2.19              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | WET PAINT (ARROW PIVOTS) (3)                          |
| GUIDE SIGNS         |               |                   |              |                      |                 |                    |                                                       |
| E05-1               | 36X48         | 12.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | GORE EXIT (3)                                         |
| E05-2               | 48X36         | 12.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | EXIT OPEN                                             |
| E05-2a              | 48X36         | 12.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | EXIT CLOSED                                           |
| G020-1              | 60X24         | 10.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | ROAD WORK NEXT XX MILES                               |
| G020-2              | 48X24         | 8.00              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | END ROAD WORK                                         |
| G020-4              | 36X18         | 4.50              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | PILOT CAR FOLLOW ME – REAR VEHICLE MOUNT SIGN         |
| G020-4a             | 42X30         | 8.75              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | PILOT CAR IN USE WAIT & FOLLOW – STATE ROUTE SIGN     |
| G020-4a             | 18X12         | 1.50              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | PILOT CAR IN USE WAIT & FOLLOW – NON-STATE ROUTE SIGN |
| G020-5aP            | 36X24         | 6.00              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | WORK ZONE (PLAQUE) (3)(5)                             |
| M04-8a              | 24X18         | 3.00              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | END DETOUR                                            |
| M04-9L              | 48X36         | 12.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | DETOUR (LEFT)                                         |
| M04-9R              | 48X36         | 12.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | DETOUR (RIGHT)                                        |
| M04-9P              | 48X12         | 4.00              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | STREET NAME (PLAQUE)                                  |
| M04-10L             | 48X18         | 6.00              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | DETOUR ARROW (LEFT)                                   |
| M04-10R             | 48X18         | 6.00              | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | DETOUR ARROW (RIGHT)                                  |
| REGULATORY SIGNS    |               |                   |              |                      |                 |                    |                                                       |
| R1-1                | 48X48         | 13.25             | ASTM 4       | WH                   | RD              | SH                 | STOP                                                  |
| R1-2                | 48 TRI.       | 6.93              | ASTM 4       | RD                   | WH              | SH                 | YIELD                                                 |
| R1-2aP              | 36X36         | 9.00              | ASTM 4       | BK                   | WH              | SH                 | TO ONCOMING TRAFFIC (PLAQUE)                          |
| R1-3P               | 30X12         | 2.50              | ASTM 4       | WH                   | RD              | SH                 | ALL WAY (PLAQUE)                                      |
| R2-1                | 36X48         | 12.00             | ASTM 4       | BK                   | WH              | SH                 | SPEED LIMIT XX                                        |
| R3-1                | 48X48         | 16.00             | ASTM 4       | BK/RD                | WH              | SH                 | NO RIGHT TURN (SYMBOL)                                |
| R3-2                | 48X48         | 16.00             | ASTM 4       | BK/RD                | WH              | SH                 | NO LEFT TURN (SYMBOL)                                 |
| R3-3                | 36X36         | 9.00              | ASTM 4       | BK                   | WH              | SH                 | NO TURNS                                              |
| R3-4                | 48X48         | 16.00             | ASTM 4       | BK/RD                | WH              | SH                 | NO U-TURN (SYMBOL)                                    |
| R3-7L               | 30X30         | 6.25              | ASTM 4       | BK                   | WH              | SH                 | LEFT LANE MUST TURN LEFT                              |
| R3-7R               | 30X30         | 6.25              | ASTM 4       | BK                   | WH              | SH                 | RIGHT LANE MUST TURN RIGHT                            |
| R4-1                | 36X48         | 12.00             | ASTM 4       | BK                   | WH              | SH                 | DO NOT PASS                                           |
| R4-2                | 36X48         | 12.00             | ASTM 4       | BK                   | WH              | SH                 | PASS WITH CARE                                        |
| R4-7a               | 36X48         | 12.00             | ASTM 4       | BK                   | WH              | SH                 | KEEP RIGHT (HORIZONTAL ARROW)                         |
| R4-8a               | 36X48         | 12.00             | ASTM 4       | BK                   | WH              | SH                 | KEEP LEFT (HORIZONTAL ARROW)                          |
| R5-1                | 30X30         | 6.25              | ASTM 4       | RD                   | WH              | SH                 | DO NOT ENTER                                          |
| R5-1a               | 36X24         | 6.00              | ASTM 4       | WH                   | RD              | SH                 | WRONG WAY                                             |
| R6-1L               | 54X18         | 6.75              | ASTM 4       | BK                   | WH              | SH                 | ONE WAY ARROW (LEFT)                                  |
| R6-1R               | 54X18         | 6.75              | ASTM 4       | BK                   | WH              | SH                 | ONE WAY ARROW (RIGHT)                                 |
| R6-2L               | 24X30         | 5.00              | ASTM 4       | BK                   | WH              | SH                 | ONE WAY (LEFT)                                        |
| R6-2R               | 24X30         | 5.00              | ASTM 4       | BK                   | WH              | SH                 | ONE WAY (RIGHT)                                       |
| R9-9                | 24X12         | 2.00              | ASTM 4       | BK                   | WH              | SH                 | SIDEWALK CLOSED                                       |
| R9-11L              | 24X18         | 3.00              | ASTM 4       | BK                   | WH              | SH                 | SIDEWALK CLOSED AHEAD (LEFT ARROW) CROSS HERE         |
| R9-11R              | 24X18         | 3.00              | ASTM 4       | BK                   | WH              | SH                 | SIDEWALK CLOSED AHEAD (RIGHT ARROW) CROSS HERE        |
| R10-6               | 24X36         | 6.00              | ASTM 4       | BK                   | WH              | SH                 | STOP HERE ON RED (45° ARROW)                          |
| R11-2               | 48X30         | 10.00             | ASTM 4       | BK                   | WH              | SH                 | ROAD CLOSED                                           |
| R11-3a              | 60X30         | 12.50             | ASTM 4       | BK                   | WH              | SH                 | ROAD CLOSED XX MILES AHEAD LOCAL TRAFFIC ONLY         |
| R11-4               | 60X30         | 12.50             | ASTM 4       | BK                   | WH              | SH                 | ROAD CLOSED TO THRU TRAFFIC                           |
| CONST-3A            | 60X48         | 20.00             | ASTM 4       | BK                   | WH/FL. OR       | SH                 | FINE SIGN (3)                                         |
| CONST-3X            | 56X12         | 4.67              | ASTM 4       | BK                   | WH              | SH                 | SPEEDING/PASSING (PLATE) (3)                          |
| MISCELLANEOUS SIGNS |               |                   |              |                      |                 |                    |                                                       |
| CONST-5             | 48X36         | 12.00             | ASTM 4       | WH                   | BL              | SH                 | POINT OF PRESENCE                                     |
| CONST-5             | 96X48         | 32.00             | ASTM 4       | WH                   | BL              | SH                 | POINT OF PRESENCE                                     |
| CONST-8             | 48X36         | 12.00             | ASTM 9 OR 11 | BK                   | FL. OR          | SHF                | WORK ZONE NO PHONE ZONE                               |
|                     |               |                   |              |                      |                 |                    |                                                       |
|                     |               |                   |              |                      |                 |                    |                                                       |

- (1) SIGN DEPICTION, ARROW, BORDERS AND SPACING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA.
- (2) REFER TO THE LATEST EDITION OF MUTCD PART VI BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA FOR SIGN DEPICTION. ARROW, BORDERS AND SPACING SHALL CONFORM TO THE GUIDELINES SET FORTH IN THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA.
- (3) ARROW, BORDERS AND SPACING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA.
- (4) USE OF A SUPPLEMENTAL PLATE FOR LINE 1 IS ACCEPTABLE.
- (5) PLAQUE AND APPLICABLE REGULATORY SIGN MAY BE MANUFACTURED AS ONE SIGN.
- (6) SHF AND SH DESIGNATIONS, REFER TO STD. 903.02 SHEET 1 OF 8.

GENERAL NOTES:

SIGN LAYOUTS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA, UNLESS SPECIFIED OTHERWISE.

SIGN DIMENSIONS SHOWN ARE MINIMUM. NO ADDITIONAL PAYMENT WILL BE MADE IF CONTRACTORS USE LARGER SIGNS.

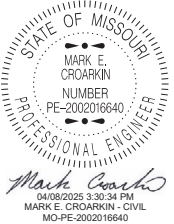
NO ADDITIONAL PAYMENT WILL BE MADE FOR PLATES.

ALL PLAQUES SHALL HAVE A BORDER. PLATES SHALL NOT HAVE A BORDER.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

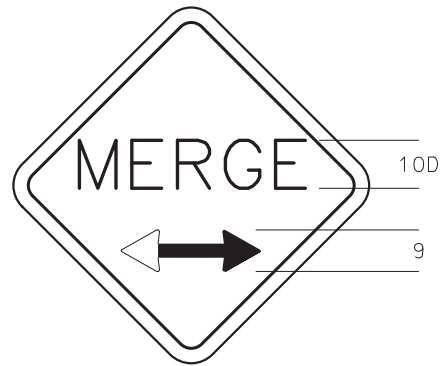


TEMPORARY  
TRAFFIC CONTROL DEVICES  
WARNING, GUIDE  
AND REGULATORY SIGNS

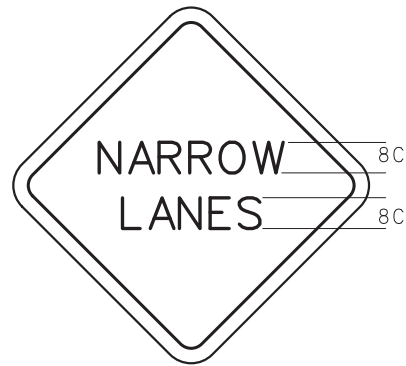
DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/11/2025

616.10BF

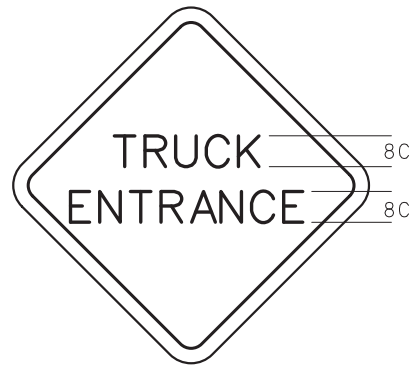
SHEET NO.  
7 OF 9



W04-1a



W05-5 (3)



W08-6c (3)



W08-7a (3)

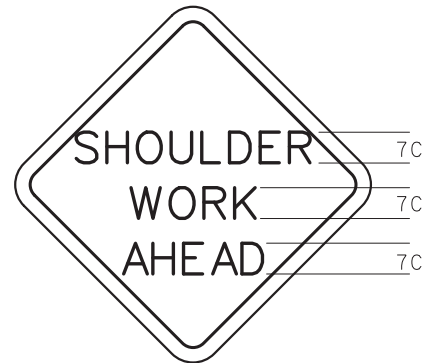
- (1) SIGN DEPICTION, ARROW, BORDERS AND SPACING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA.
- (2) REFER TO THE LATEST EDITION OF MUTCD PART VI BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA FOR SIGN DEPICTION. ARROW, BORDERS AND SPACING SHALL CONFORM TO THE GUIDELINES SET FORTH IN THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA.
- (3) ARROW, BORDERS AND SPACING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA.
- (4) USE OF A SUPPLEMENTAL PLATE FOR LINE 1 IS ACCEPTABLE.
- (5) PLAQUE AND APPLICABLE REGULATORY SIGN MAY BE MANUFACTURED AS ONE SIGN.



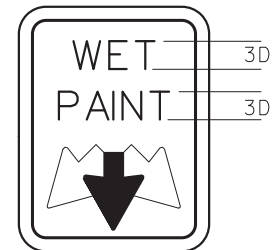
W012-4 (3)



W020-6a (3)(4)



W021-5 (3)

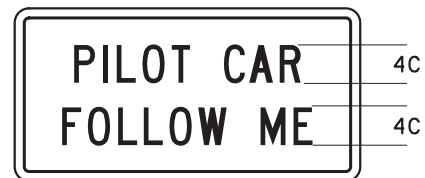


G022-1 (3)

- \* SHALL ONLY BE USED AT PRIVATE AND COMMERCIAL ENTRANCES TO ENHANCE THE WORK ZONE SIGNING AND WILL NOT BE PERMITTED FOR USE ON INTERSECTING STATE, COUNTY OR CITY ROADS. SIGN SHALL BE PRINTED ON 4MM CORRUGATED PLASTIC OR SIMILAR AND SUPPORTED WITH A 10"x30" 9-GAUGE GALVANIZED STEEL H-FRAME OR SIMILAR. COST OF SIGNS AND STANDS IS INCIDENTAL TO OTHER TRAFFIC CONTROL ITEMS.



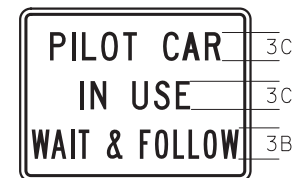
W012-5 (3)



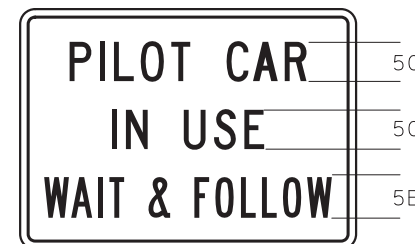
G020-4 (3)



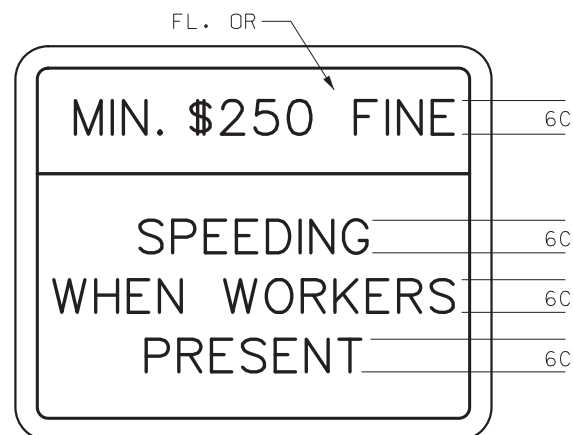
18X12  
NON-STATE ROUTE



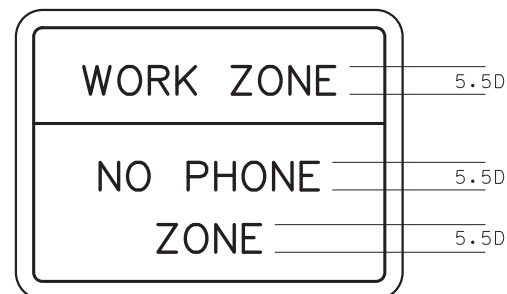
24X18 \*  
ENTRANCE



42X30  
STATE ROUTE  
G020-4a (3)



CONST-3A (3)



CONST-8 (3)



CONST-3X (3)

GENERAL NOTES:

SIGN LAYOUTS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "STANDARD HIGHWAY SIGNS" BY THE U.S. DEPARTMENT OF TRANSPORTATION - FHWA, UNLESS SPECIFIED OTHERWISE.

SIGN DIMENSIONS SHOWN ARE MINIMUM. NO ADDITIONAL PAYMENT WILL BE MADE IF CONTRACTORS USE LARGER SIGNS.

NO ADDITIONAL PAYMENT WILL BE MADE FOR PLATES.

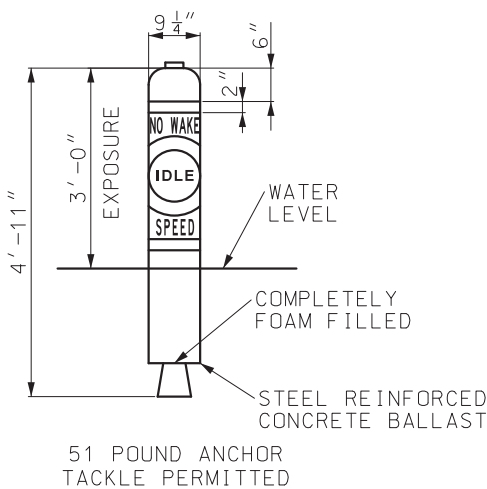
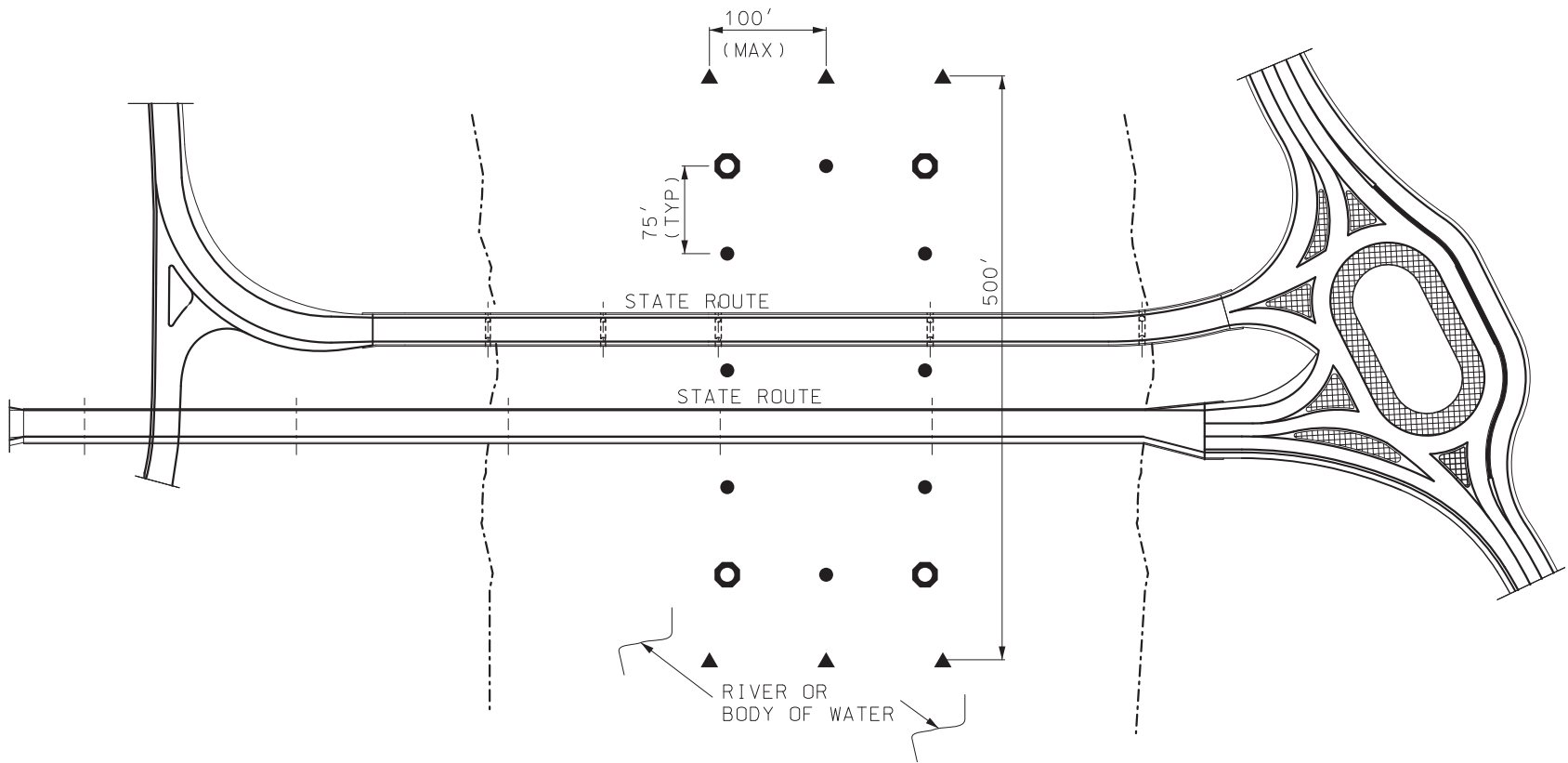
ALL PLAQUES SHALL HAVE A BORDER. PLATES SHALL NOT HAVE A BORDER.

LETTER DIMENSIONS SHALL BE AS SHOWN.

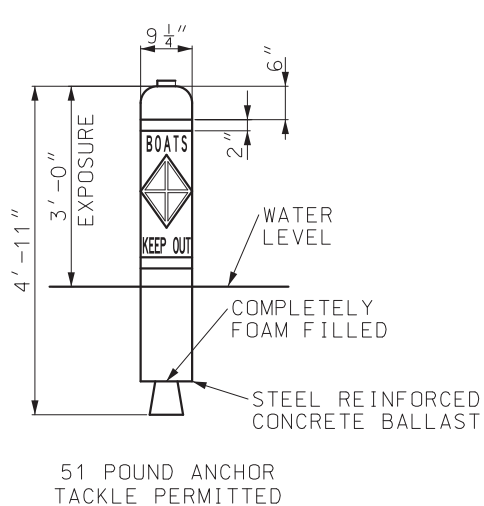
|                                                                                       |           |                                                                                  |                     |
|---------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------|---------------------|
|  |           | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |                     |
|                                                                                       |           | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                     |
|  |           | <b>TEMPORARY TRAFFIC CONTROL DEVICES</b>                                         |                     |
| DATE EFFECTIVE:                                                                       | 7/1/2025  | 616.10BF                                                                         | SHEET NO.<br>8 OF 9 |
| DATE PREPARED:                                                                        | 3/11/2025 |                                                                                  |                     |

LEGEND

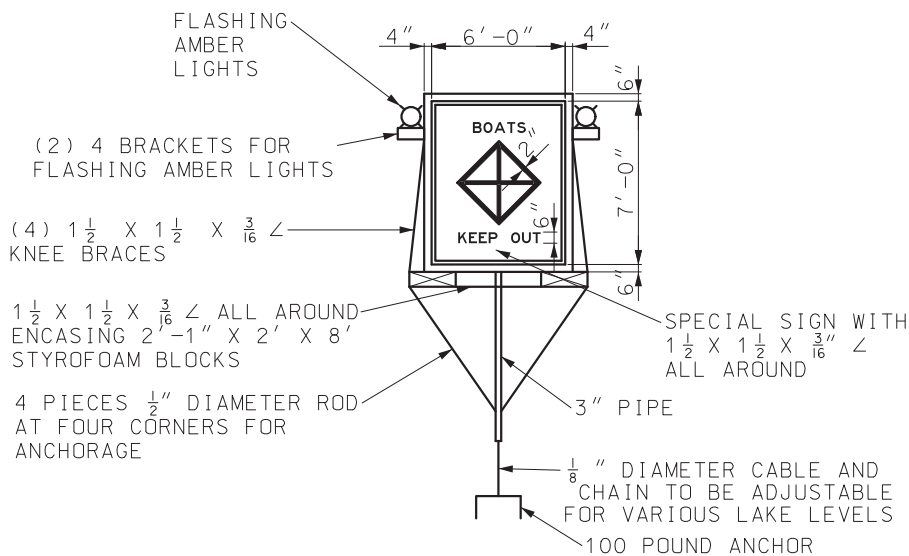
- - BOATS KEEP OUT (SIGN)
- - BOATS KEEP OUT (BUOY)
- ▲ - NO WAKE (BUOY)



RESTRICTED AREA BUOY  
("NO WAKE")  
(6 REQUIRED - ROADWAY ITEM)



CONTROLLED AREA BUOY  
("BOATS KEEP OUT")  
(8 REQUIRED - ROADWAY ITEM)



SPECIAL SIGN ASSEMBLY  
("BOATS KEEP OUT")  
(4 REQUIRED - ROADWAY ITEM)

GENERAL NOTES:

LAYOUT SHOWN IS SCHEMATIC ONLY. FINAL LOCATION AND NUMBER OF SIGNS AND BUOYS IS SUBJECT TO APPROVAL OF MISSOURI STATE WATER PATROL.

DETAILS SHOWN ARE FOR BIDDING PURPOSES ONLY. ALL MATERIALS AND LABOR NECESSARY TO INSTALL AND REMOVE SIGNS AND BUOYS SHALL BE INCIDENTAL.

THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE THROUGHOUT CONSTRUCTION AND FOR DETERMINING ANTICIPATED WATER LEVELS DURING CONSTRUCTION. EACH SIGN AND BUOY SHALL BE ANCHORED TO CHANNEL BOTTOM.

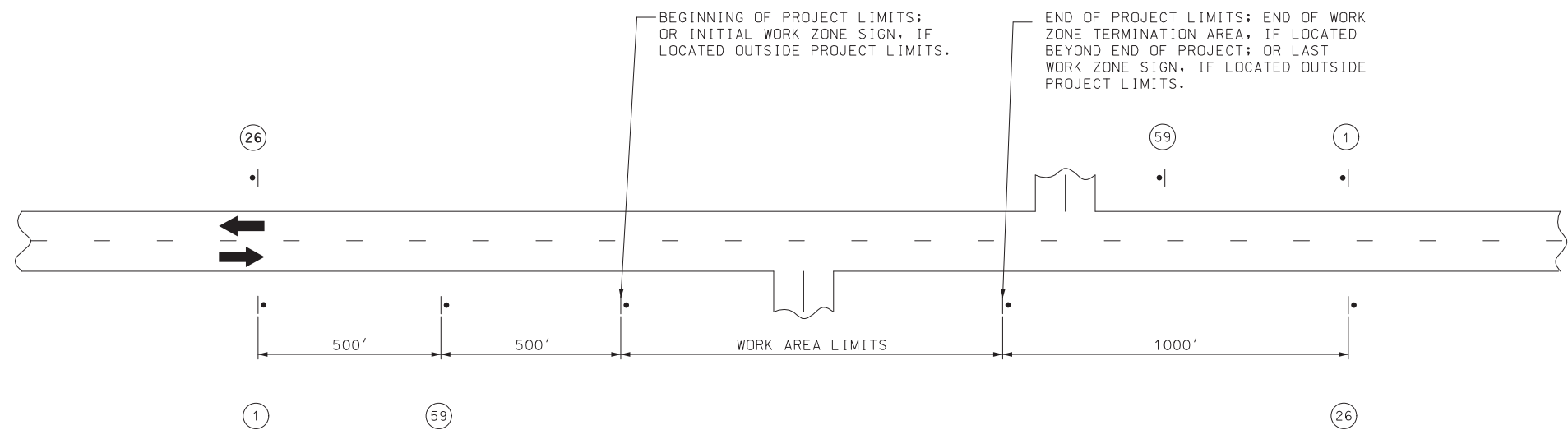
SIGNS SHALL BE DOUBLE FACED AND EACH SIGN SHALL BE EQUIPPED WITH TWO (2) FLASHING LIGHT UNITS WITH AMBER LENS. FLASHING LIGHT UNITS SHALL BE FURNISHED AND MAINTAINED BY THE CONTRACTOR.

ALL LETTERING TO BE BLACK IN COLOR AND IN BLOCK FORM.

SCHEMATIC SHOWN IS FOR ONE NAVIGATIONAL SPAN. FOR WORK ON OTHER SPANS, MOVE APPROPRIATE ITEMS WITH NO DIRECT PAY.

COLOR:  
BACKGROUND - WHITE  
LEGEND - BLACK  
2" REFLECTIVE BAND / SYMBOL - INTERNATIONAL ORANGE

|                                                                                                                                              |                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                                                                    |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                                                                    |
|                                                         | <b>TEMPORARY<br/>TRAFFIC CONTROL DEVICES<br/>TRAFFIC CONTROL<br/>FOR WATERWAYS</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025                                                                                         | 616.10BF                                                                           |
| SHEET NO.<br>9 OF 9                                                                                                                          |                                                                                    |

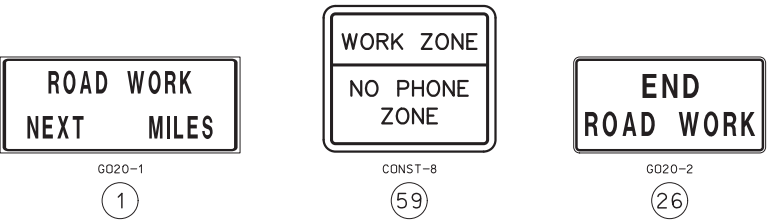


NOTES:

SIGN 1 AND 26 ARE ONLY USED ON PROJECT LENGTHS 2 MILES OR GREATER.

PROVIDE SIGNS IN EACH DIRECTION ON TWO-WAY HIGHWAY.

DISTANCE MAY BE ADJUSTED ACCORDING TO FIELD CONDITIONS.



THIS TEMPORARY TRAFFIC CONTROL IS FOR USE ON THE FOLLOWING PAVEMENT TREATMENT PROJECTS AND IS NOT INTENDED FOR USE WHEN ADDITIONAL CONSTRUCTION ITEMS SUCH AS SHOULDER WIDENING, PIPE REPLACEMENT OR EXTENSIONS, GUARDRAIL CONSTRUCTION OR REPAIR, AND/OR SIGN INSTALLATIONS ARE PART OF THE PROJECT:

- ASPHALTIC RESURFACING (SECTIONS 401 AND 402)
- SEAL COAT
- SCRUB SEAL/SAND SEAL



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



TEMPORARY TRAFFIC CONTROL PLANS

PAVEMENT TREATMENTS FOR TWO-LANE ROADWAYS

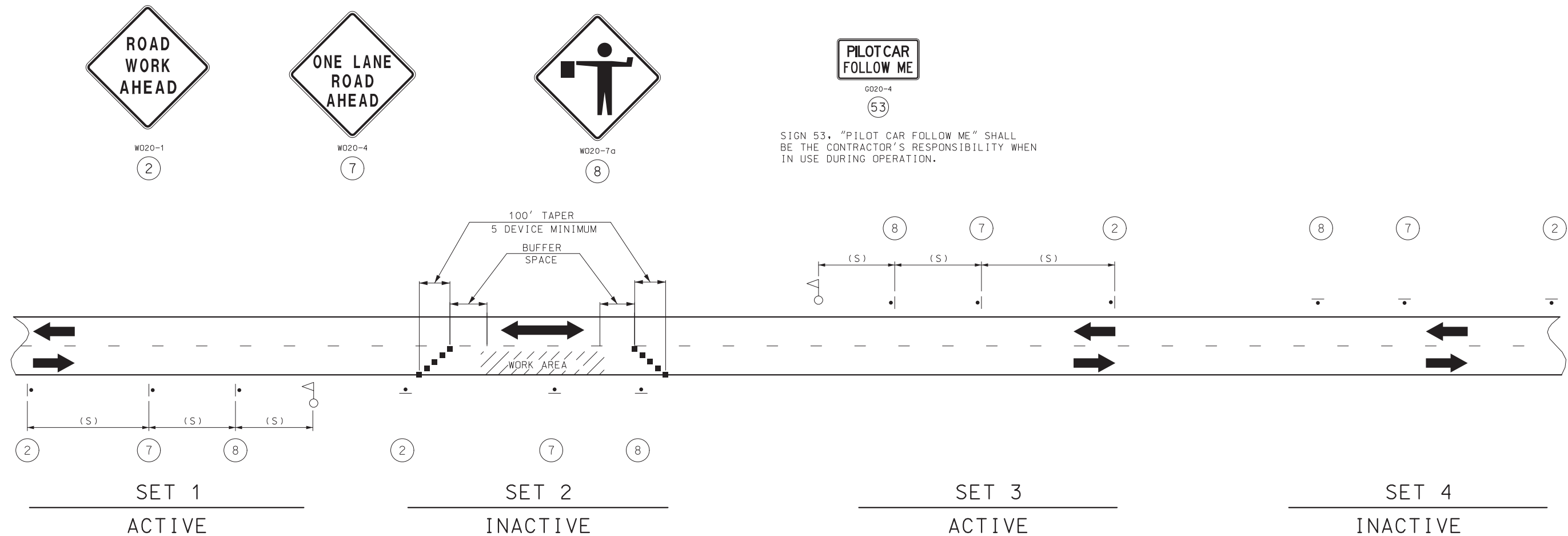
DATE EFFECTIVE: 7/1/2025

DATE PREPARED: 3/11/2025

616.20E

SHEET NO.  
1 OF 5





NOTES:

THIS PLAN IS FOR DAYLIGHT FLAGGING OPERATIONS ONLY. WHEN NIGHT WORK IS REQUIRED, OR OTHERWISE ALLOWED BY THE ENGINEER, WORK ZONE LIGHTING SHALL BE PROVIDED IN ACCORDANCE WITH SEC 616.5.2.

CHANNELIZING DEVICES LOCATED DOWNSTREAM OF THE ONE-LANE, TWO-WAY TAPER ARE OPTIONAL. THESE DEVICES SHOULD BE ELIMINATED WHEN THEIR USE WILL REDUCE THE USABLE LANE WIDTH, INCLUDING ANY ACCEPTABLE SHOULDERS, TO LESS THAN 10' OR WILL SIGNIFICANTLY AFFECT THE RESURFACING OPERATION.

SIGN SETS 1 AND 3 ARE ACTIVE AND (I.E., SIGNS FACE ONCOMING TRAFFIC) SIGN SETS 2 AND 4 ARE INACTIVE (I.E., SIGNS DO NOT FACE EITHER DIRECTION OF TRAFFIC) WHEN THE RESURFACING OPERATION IS LOCATED BETWEEN SIGN SETS 1 AND 3.

WHEN SIGN SETS 2 AND 4 ARE ACTIVE, SIGN SETS 1 AND 3 BECOME INACTIVE AND ARE ADVANCED TO BECOME SETS 2 AND 4 WITH SIGN LEGENDS TURNED AWAY FROM BOTH DIRECTIONS OF TRAFFIC. WHEN THE RESURFACING OPERATION ADVANCES TO BETWEEN SIGN SETS 2 AND 4, SIGN SETS 2 AND 4 BECOME ACTIVE (I.E., NEW SIGN SETS 1 AND 3) AND SIGN SETS 1 AND 3 ADVANCED IN THE DIRECTION OF THE OPERATION (I.E., NEW SIGN SETS 2 AND 4).

■ - CHANNELIZERS

○ - FLAGGER

| SPEED                  | SIGN SPACING (FT)<br>(1) | BUFFER SPACE |
|------------------------|--------------------------|--------------|
| PERMANENT POSTED (MPH) | NON-DIVIDED HIGHWAYS (S) | LENGTH (FT)  |
| 0-35                   | 200                      | 250          |
| 40-45                  | 350                      | 360          |
| 50-55                  | 500                      | 495          |
| 60-70                  | 1000                     | 730          |

(1) SPACING BETWEEN SIGNS, BETWEEN LAST SIGN AND FLAGGER, BEGINNING OF TAPER OR SIGNED CONDITION.

SPACING MAY BE ADJUSTED AS NECESSARY TO MEET FIELD CONDITIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
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TEMPORARY TRAFFIC CONTROL PLANS

PAVEMENT TREATMENTS FOR TWO-LANE ROADWAYS

DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/11/2025

616.20E

SHEET NO.  
2 OF 5

| SPEED                        | SIGN SPACING (FT)<br>(1)       | CHANNELIZER<br>SPACING (FT)    |
|------------------------------|--------------------------------|--------------------------------|
| PERMANENT<br>POSTED<br>(MPH) | NON-DIVIDED<br>HIGHWAYS<br>(S) | BUFFER/<br>WORK AREA<br>(TYP.) |
| 0-35                         | 200                            | 40                             |
| 40-45                        | 350                            | 80                             |
| 50-55                        | 500                            | 80                             |
| 60-70                        | 1000                           | 120                            |

NOT TO SCALE

(1) SPACING BETWEEN SIGNS, BETWEEN LAST SIGN AND FLAGGER, BEGINNING OF TAPER OR SIGNED CONDITION.

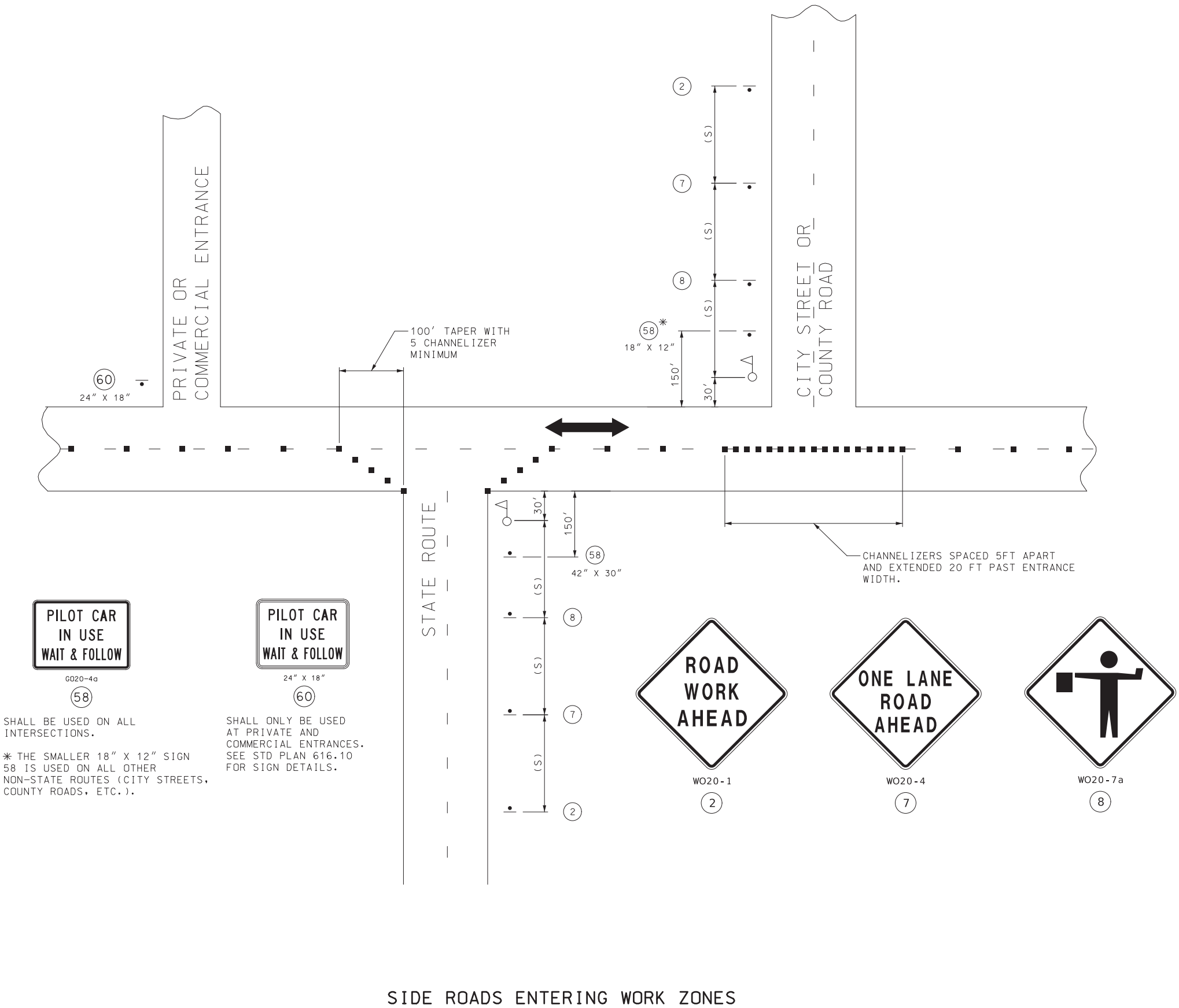
SPACING MAY BE ADJUSTED AS NECESSARY TO MEET FIELD CONDITIONS.

NOTES:  
WARNING SIGNS SHALL BE ERECTED AT EACH INTERSECTION WITH ANOTHER STATE HIGHWAY WITHIN THE WORK ZONE.

ADDITIONAL WARNING SIGNS SHALL BE ERECTED AT OTHER INTERSECTIONS WITHIN THE WORK ZONE, AS DIRECTED BY THE ENGINEER.

■ - CHANNELIZERS (AS SPECIFIED)

◁ - FLAGGER



SHALL BE USED ON ALL INTERSECTIONS.

\* THE SMALLER 18" X 12" SIGN 58 IS USED ON ALL OTHER NON-STATE ROUTES (CITY STREETS, COUNTY ROADS, ETC.).

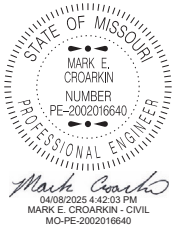
SHALL ONLY BE USED AT PRIVATE AND COMMERCIAL ENTRANCES. SEE STD PLAN 616.10 FOR SIGN DETAILS.

CHANNELIZERS SPACED 5FT APART AND EXTENDED 20 FT PAST ENTRANCE WIDTH.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**TEMPORARY TRAFFIC CONTROL PLANS**

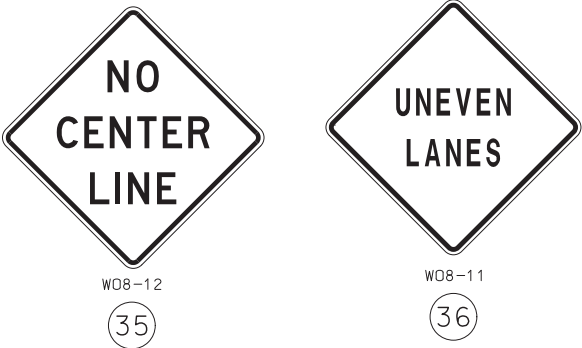
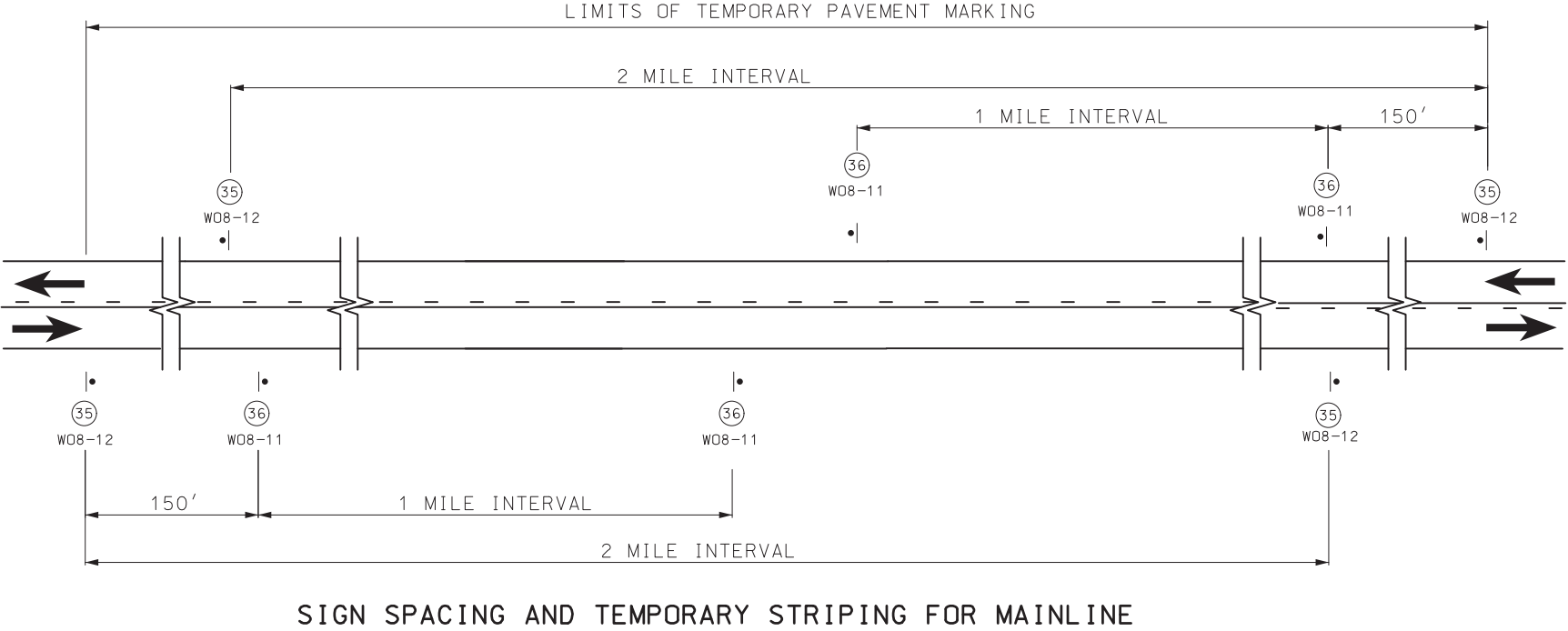
PAVEMENT TREATMENTS FOR TWO-LANE ROADWAYS

DATE EFFECTIVE: 7/1/2025

DATE PREPARED: 3/11/2025

**616.20E**

SHEET NO.  
**3 OF 5**



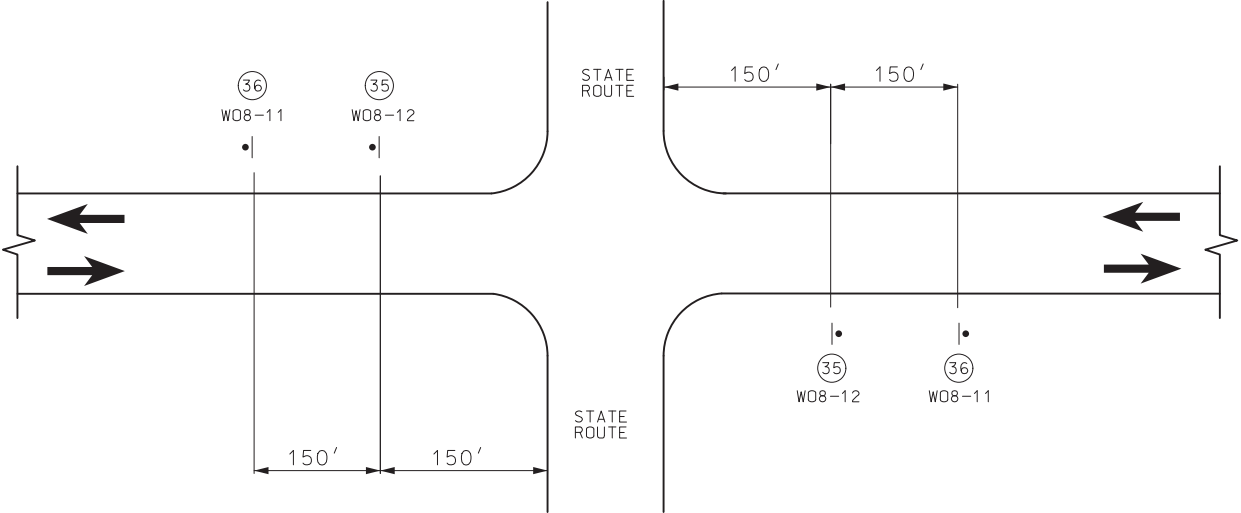
NOTES:

SIGN (35) AND TEMPORARY RAISED PAVEMENT MARKING (SEE STANDARD PLAN 620.10) INSTALLED WHERE CENTERLINE STRIPING HAS BEEN COVERED OR REMOVED. SIGNS ARE TO REMAIN IN PLACE UNTIL THE PERMANENT CENTERLINE PAVEMENT MARKINGS ARE IN PLACE. SIGNS SHALL BE COVERED OR REMOVED WHEN PAVEMENT CENTERLINE MARKING HAS BEEN INSTALLED.

SIGN (35) IS PLACED AT APPROXIMATELY TWO-MILE INTERVALS AND AT STATE ROUTE JUNCTIONS. WHEN THE INSTALLATION AT A JUNCTION IS WITHIN ONE-EIGHTH MILE OF THE NORMAL MAINLINE SIGN (35), THE LATTER MAY BE ELIMINATED.

ALL SIGNS SHALL BE POST MOUNTED AND IN ACCORDANCE WITH STANDARD PLAN 616.10 AND 903.03.

SEE STANDARD PLAN 620.10 FOR ALL TEMPORARY PAVEMENT MARKING.



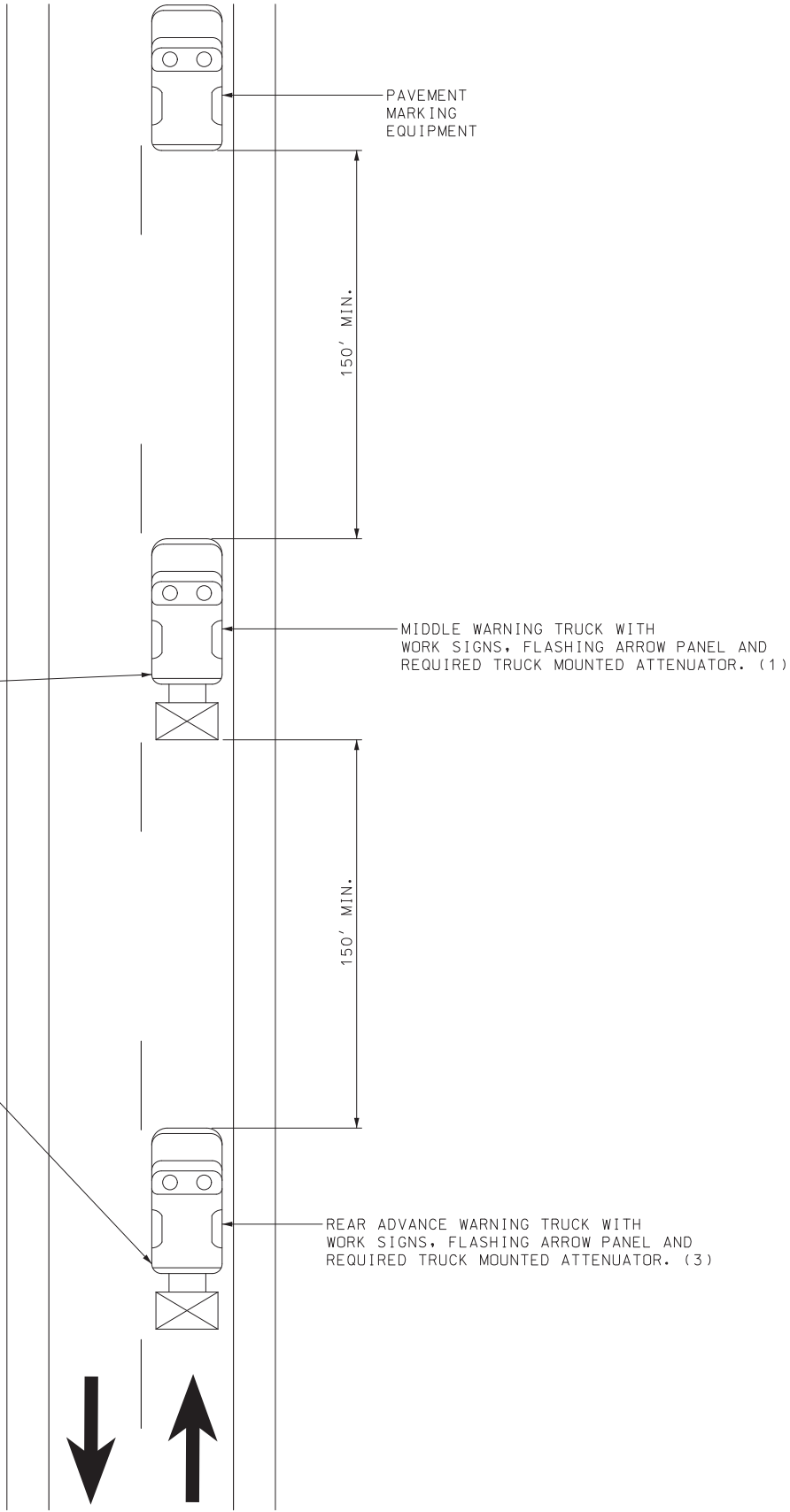
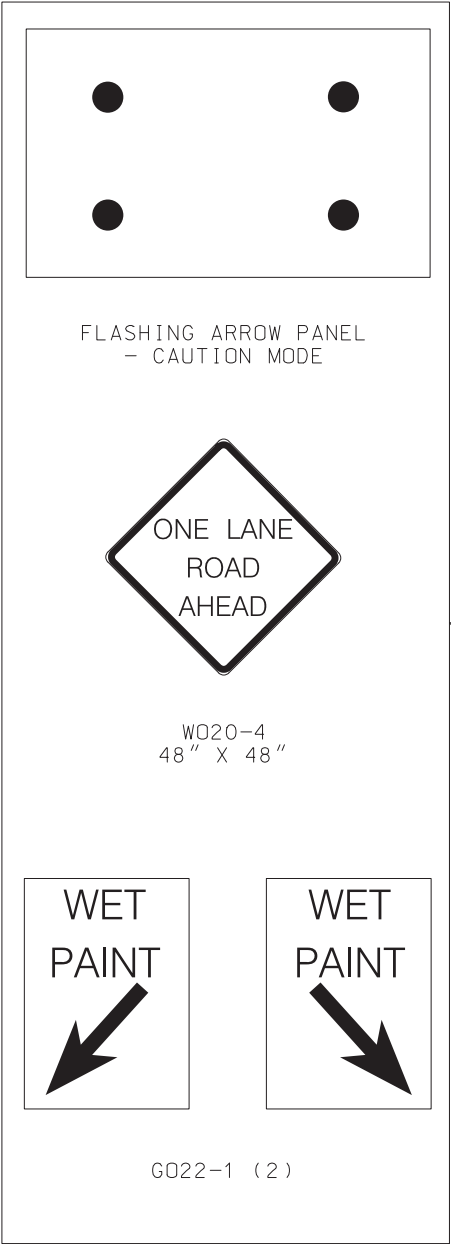


**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**TEMPORARY TRAFFIC CONTROL PLANS**  
PAVEMENT TREATMENTS FOR TWO-LANE ROADWAYS

|                 |           |                |                     |
|-----------------|-----------|----------------|---------------------|
| DATE EFFECTIVE: | 7/1/2025  | <b>616.20E</b> | SHEET NO.<br>4 OF 5 |
| DATE PREPARED:  | 3/11/2025 |                |                     |



CENTERLINE/EDGELINE STRIPING ON TWO-LANE HIGHWAYS

NOTES:

UPON APPROVAL OF THE ENGINEER, THE CONTRACTOR MAY PROVIDE ADDITIONAL PROTECTIVE TRUCK EQUIPPED WITH PROPER WARNING DEVICES.

PROTECTIVE TRUCK AND WORK VEHICLES SHALL DISPLAY HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.

VEHICLE HAZARD WARNING SIGNALS SHALL NOT BE USED INSTEAD OF THE VEHICLE'S HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.

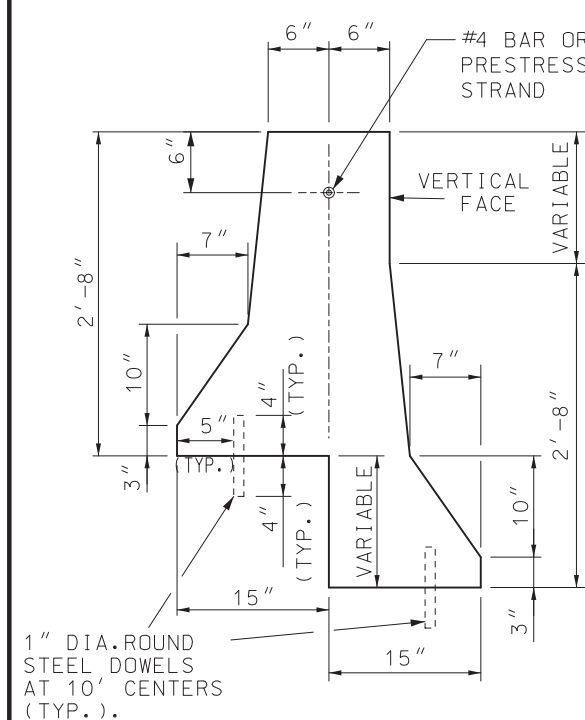
FLASHING ARROW PANELS SHALL BE INCIDENTAL TO TRUCK MOUNTED ATTENUATORS, WHEREVER USED. NO ADDITIONAL PAYMENT WILL BE MADE.

(1) TRUCK IS OPTIONAL ON TWO-LANE UNDIVIDED HIGHWAYS IF SIGNING AND ARROW BOARD IS MOUNTED ON THE PAVEMENT MARKING EQUIPMENT.

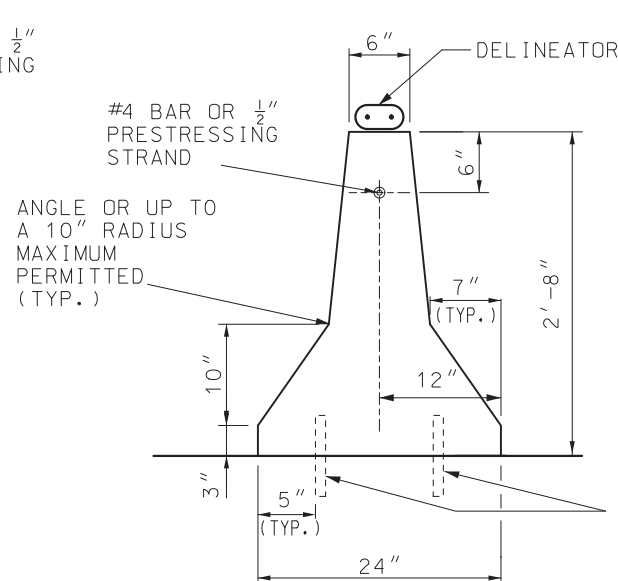
(2) WET PAINT SIGNS ARE INSTALLED TO INDICATE THE SIDE IN WHICH THE PAVEMENT MARKING MATERIAL IS BEING APPLIED. AT THE CONTRACTOR'S OPTION, A FRONT FACING WET PAINT SIGN MAY BE INSTALLED ON THE LEFT SIDE OF THE PAVEMENT MARKING EQUIPMENT.

(3) REAR ADVANCE WARNING TRUCK IS POSITIONED AT THE NO TRACK POINT OF THE PAVEMENT MARKING MATERIAL, OR VERTICAL OR HORIZONTAL CURVES THAT RESTRICT SIGHT DISTANCE, OR SPACING SHOWN.

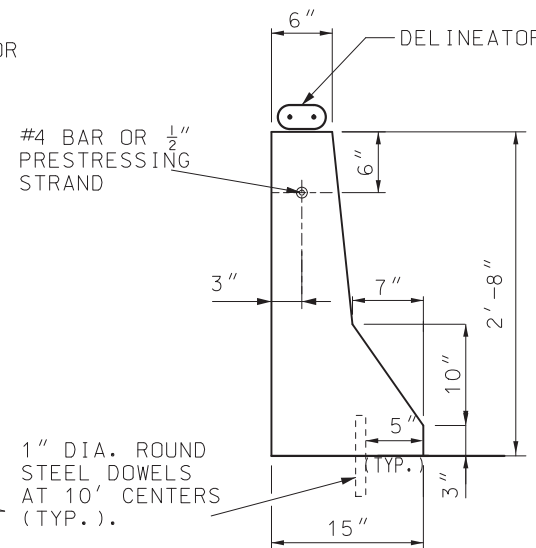
|                                                                                                                                                                                                                                                                                     |                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                    |                                                                                            |
| <br>STATE OF MISSOURI<br>MARK E. CROARKIN<br>NUMBER PE-2002016640<br>PROFESSIONAL ENGINEER<br><i>Mark E. Croarkin</i><br>04/08/2025 4:45:14 PM<br>MARK E. CROARKIN - CIVIL<br>MO-PE-2002016640 | <b>TEMPORARY TRAFFIC CONTROL PLANS</b><br><b>PAVEMENT TREATMENTS FOR TWO-LANE ROADWAYS</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025                                                                                                                                                                                                                                | <b>616.20E</b><br>SHEET NO. 5 OF 5                                                         |



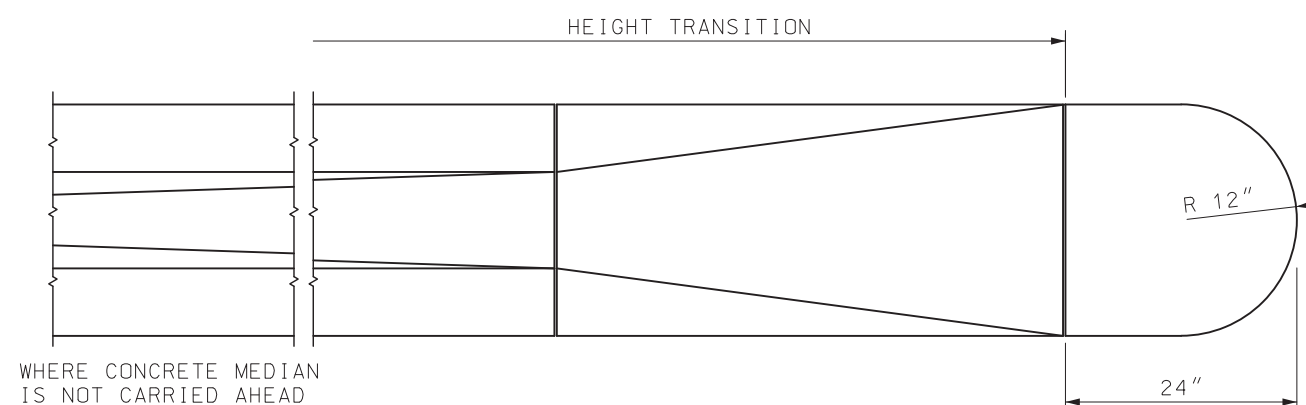
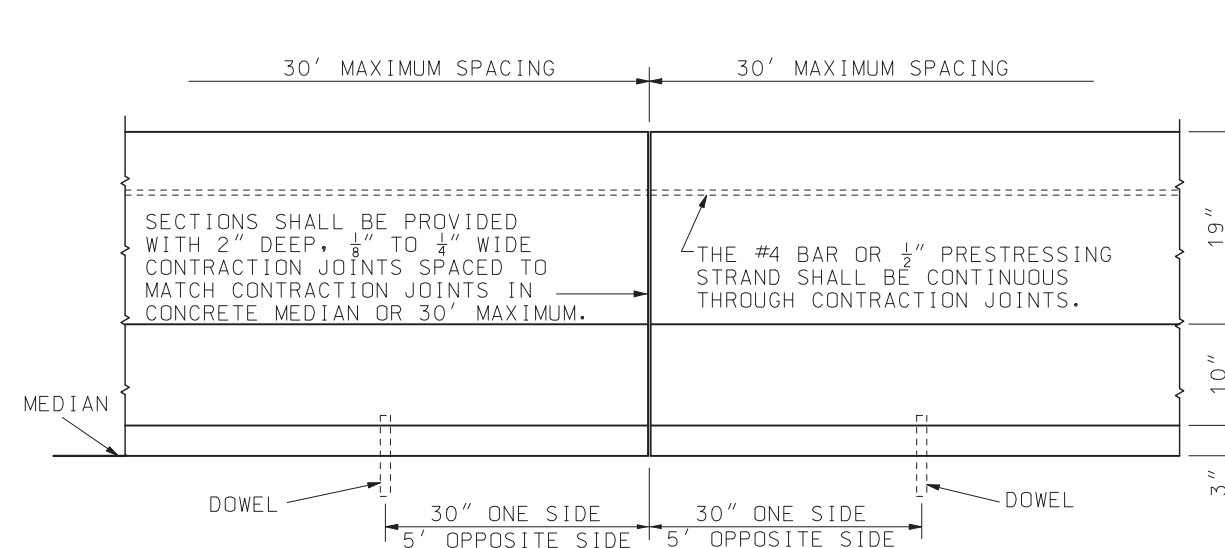
TYPICAL VIEW  
BARRIER FOR  
STEPPED PAVEMENT



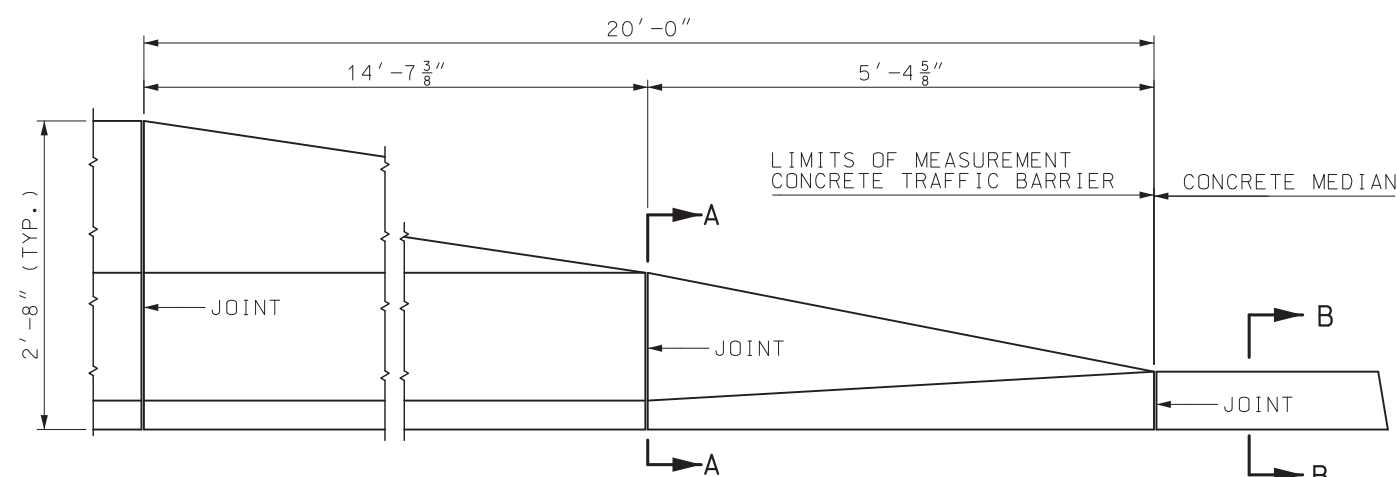
TYPICAL VIEW  
TYPE A - TWO TRAFFIC FACES



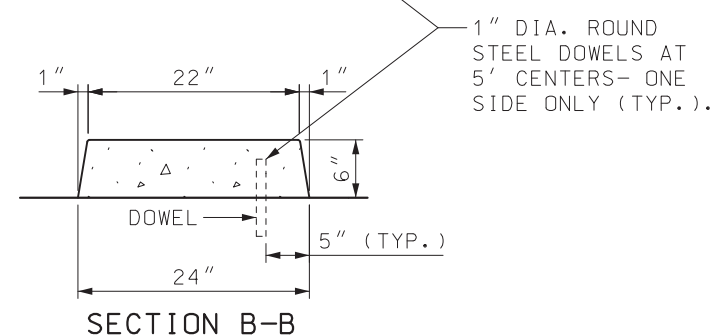
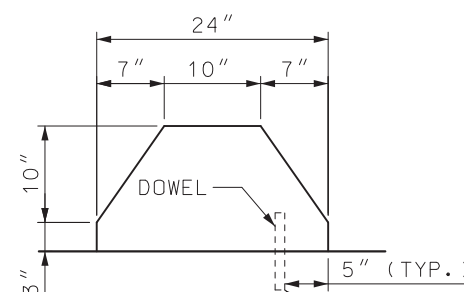
TYPICAL VIEW  
TYPE B - ONE TRAFFIC FACE



PLAN



ELEVATION  
BARRIER HEIGHT TRANSITION



#### GENERAL NOTES:

HEIGHT TRANSITIONS SHALL NOT BE USED IN LOCATIONS WHERE THE POSTED SPEED IS GREATER THAN 35 MPH.

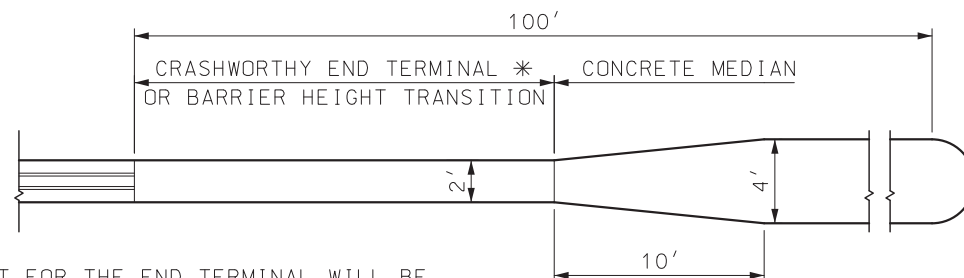
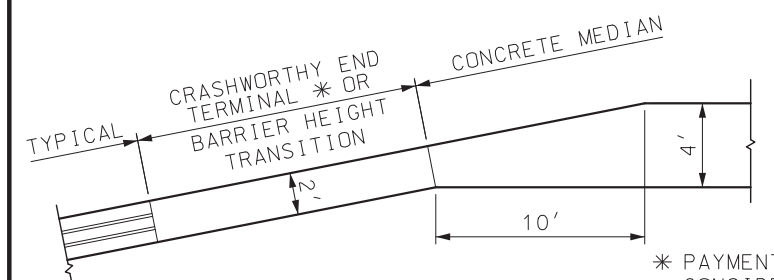
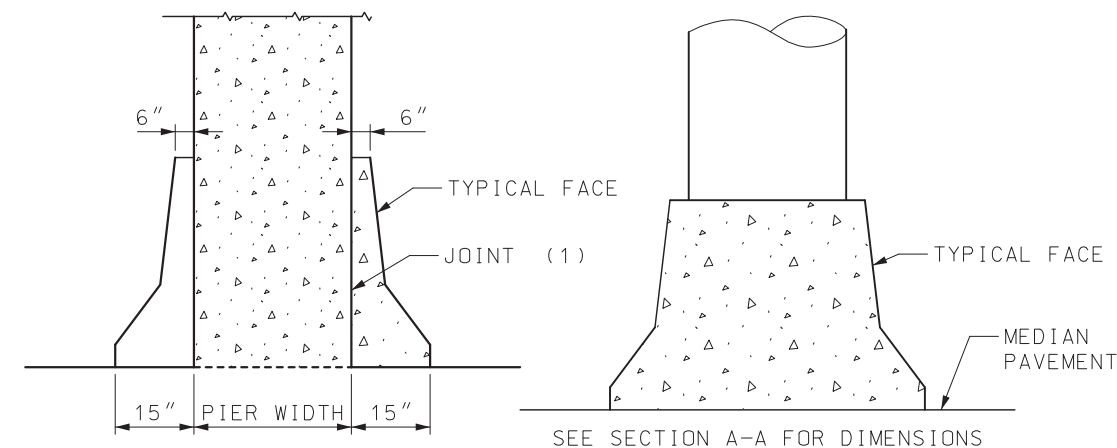
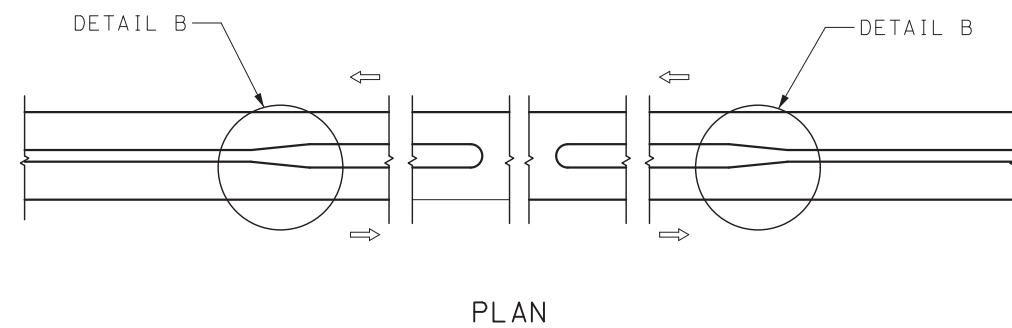
ALL TOP AND END EDGES SHALL BE CHAMFERED  $\frac{3}{4}$ ".

EXPANSION JOINTS SHALL BE PROVIDED IN THE BARRIER TO MATCH EXPANSION JOINTS IN PAVEMENT.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

|                                                                                                                                              |  |                                                                                  |                             |
|----------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------|-----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |  | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                             |
|                                                         |  | <b>PERMANENT CONCRETE TRAFFIC BARRIER</b><br><b>TYPE A AND B</b>                 |                             |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/28/2025                                                                                         |  | <b>617.10N</b>                                                                   | SHEET NO.<br><b>1 OF 11</b> |



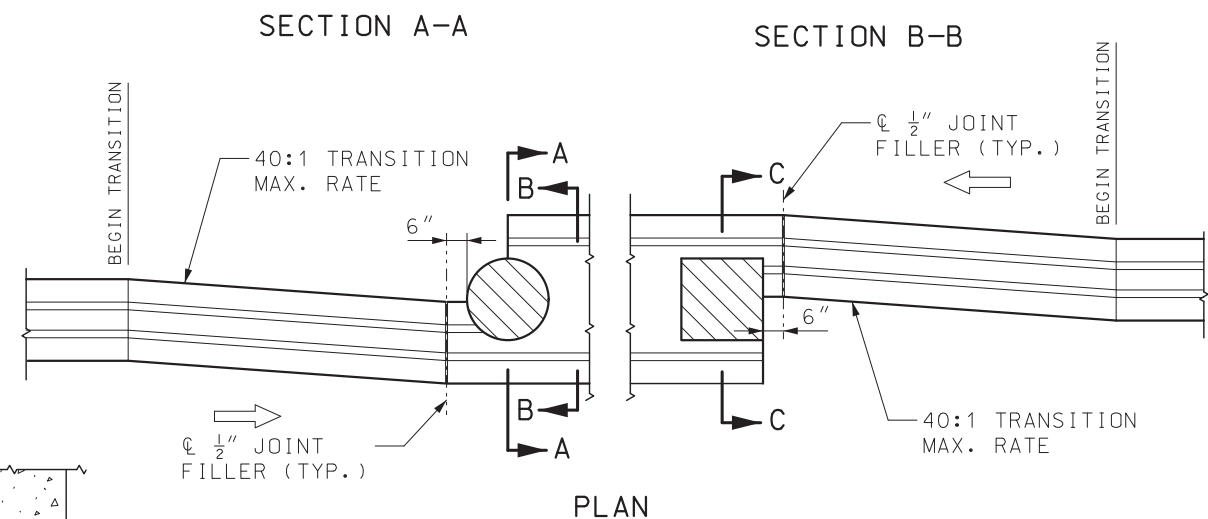
\* PAYMENT FOR THE END TERMINAL WILL BE CONSIDERED FULL COMPENSATION FOR END TERMINAL, BACKUP ASSEMBLIES, AND OTHER ITEMS NECESSARY FOR PROPER INSTALLATION AS REQUIRED BY THE MANUFACTURER.

DETAIL A

LEFT TURN LANE TRANSITION

DETAIL B

MEDIAN OPENING TRANSITION



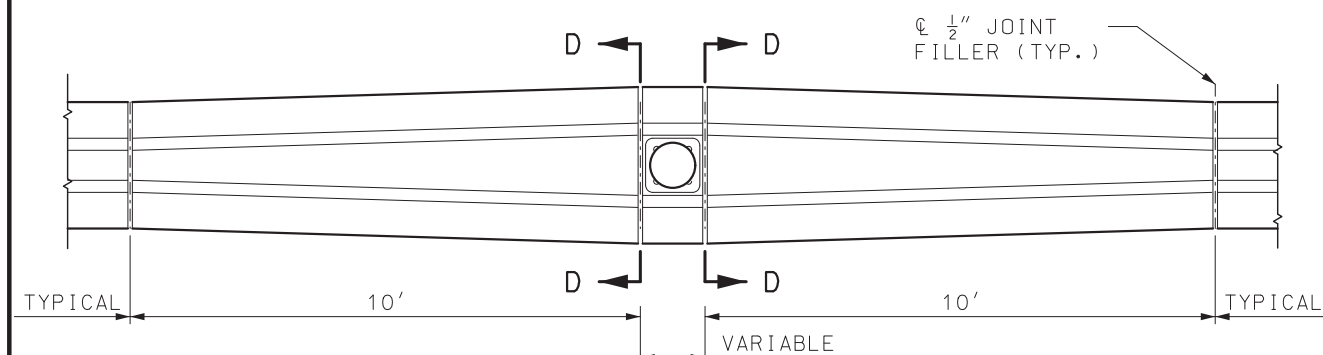
## TRANSITION DETAILS FOR PIER PROTECTION

(1) 1" JOINT WITH JOINT FILLER AND SEALER

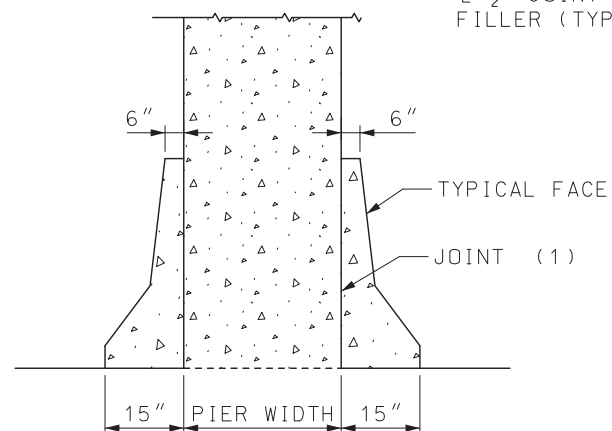
GENERAL NOTES:

FOR DETAILS AND LOCATION OF DOWELS, SEE SHEET 1.

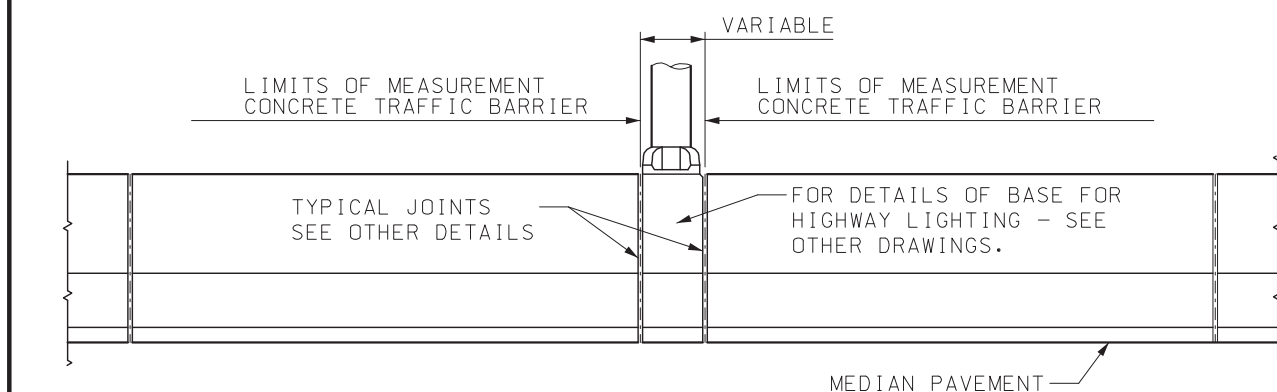
#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.



## PLAN

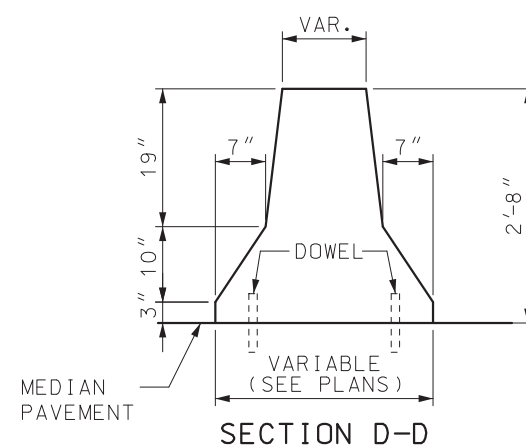


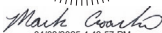
SECTION C-C

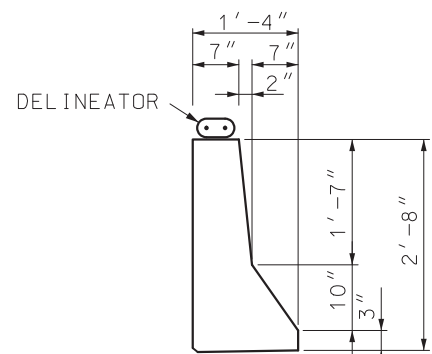


ELEVATION

### TRANSITION DETAILS FOR MEDIAN LIGHTING

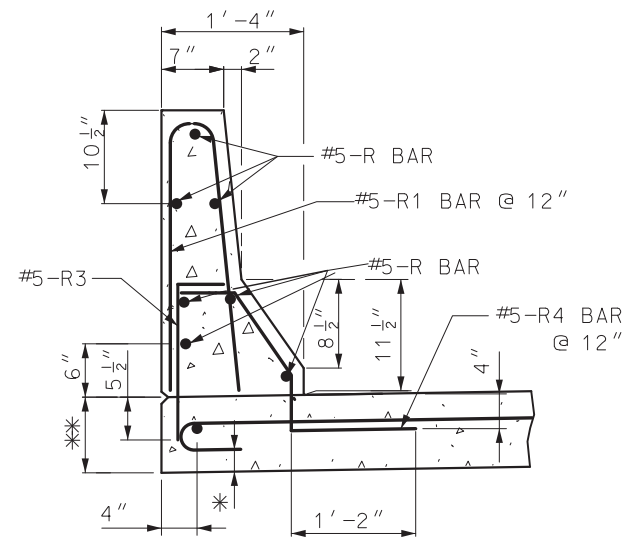


|                                                                                                                                                                                                                                                                          |                                                                                                                                                                                      |                                                    |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--|
|                                                                                                                                                                                     | <p align="center"><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p align="right">105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65107<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                    |  |
| <br><br><small>04/08/2025 4:43:57 PM<br/>MARK E. CROARKIN - CIVIL<br/>MO-PE-2002016640</small> | <p align="center"><b>PERMANENT CONCRETE<br/>TRAFFIC BARRIER</b></p> <p align="center"><b>TYPE A AND B</b></p>                                                                        |                                                    |  |
| <p>DATE EFFECTIVE: <u>7/1/2025</u></p> <p>DATE PREPARED: <u>3/28/2025</u></p>                                                                                                                                                                                            | <p align="center"><b>617.10N</b></p>                                                                                                                                                 | <p align="center">SHEET NO.<br/><b>2 OF 11</b></p> |  |

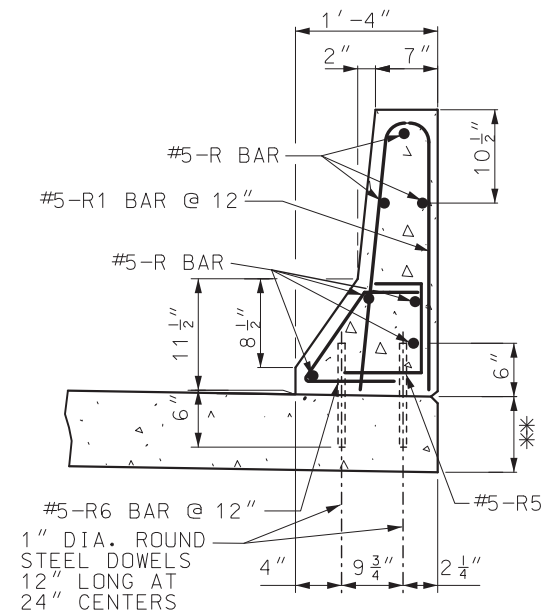


TYPE B (MODIFIED)  
TYPICAL SECTION

| TABLE A<br>TRANSVERSE PAVEMENT<br>REINFORCEMENT |                          |
|-------------------------------------------------|--------------------------|
| PAVEMENT<br>THICKNESS<br>**                     | BAR SIZE<br>&<br>SPACING |
| 8"                                              | #5 @ 5" *                |
| 9"                                              | #5 @ 6" *                |
| 10"                                             | #5 @ 8"                  |
| 11"                                             | #5 @ 9"                  |
| ≥ 12"                                           | #6 @ 12"                 |



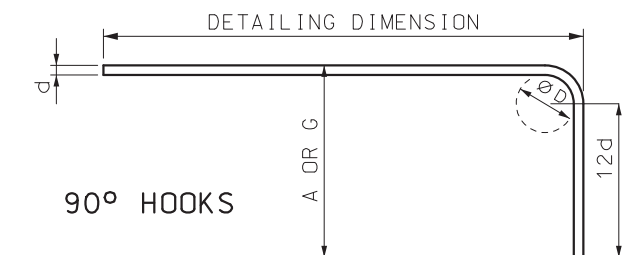
PART SECTION THROUGH  
UPPER BARRIER



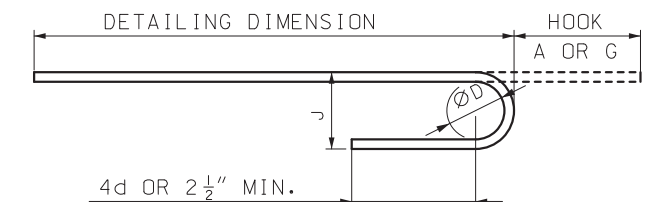
PART SECTION THROUGH  
LOWER BARRIER

| END HOOK DIMENSIONS |            |            |           |        |
|---------------------|------------|------------|-----------|--------|
| BAR<br>SIZE         | D<br>(IN.) | ALL GRADES |           |        |
|                     |            | 180° HOOKS | 90° HOOKS |        |
|                     |            | A OR G     | J         | A OR G |
| #5                  | 3 3/4"     | 7"         | 5"        | 10"    |
| #6                  | 4 1/2"     | 8"         | 6"        | 12"    |

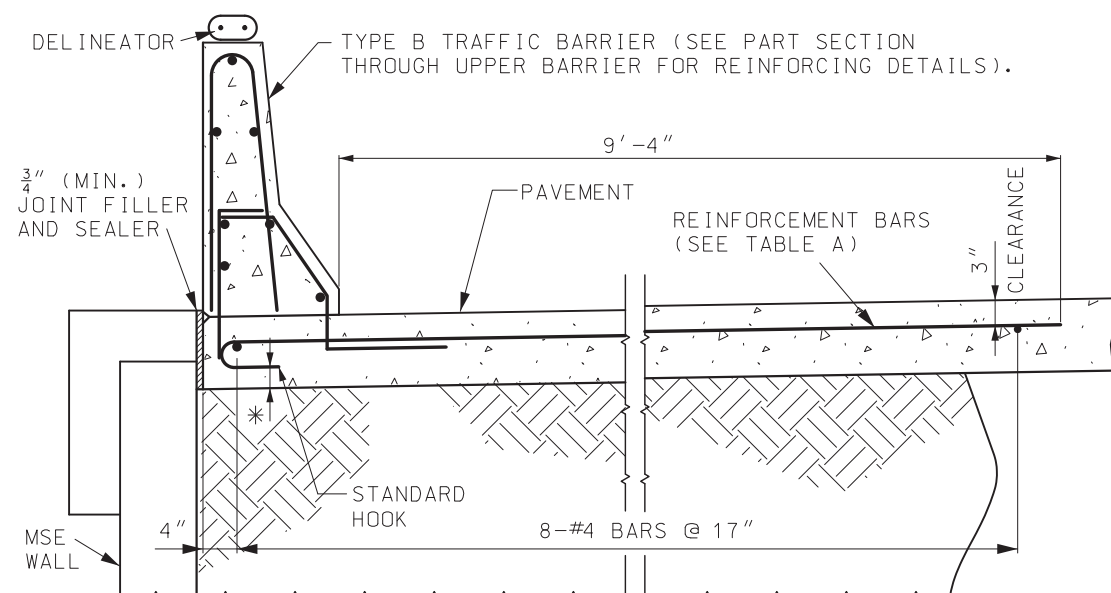
ALL STANDARD HOOKS AND BENDS OTHER THAN 180° TO BE BENT WITH THE SAME PROCEDURE AS FOR 90° STANDARD HOOKS.



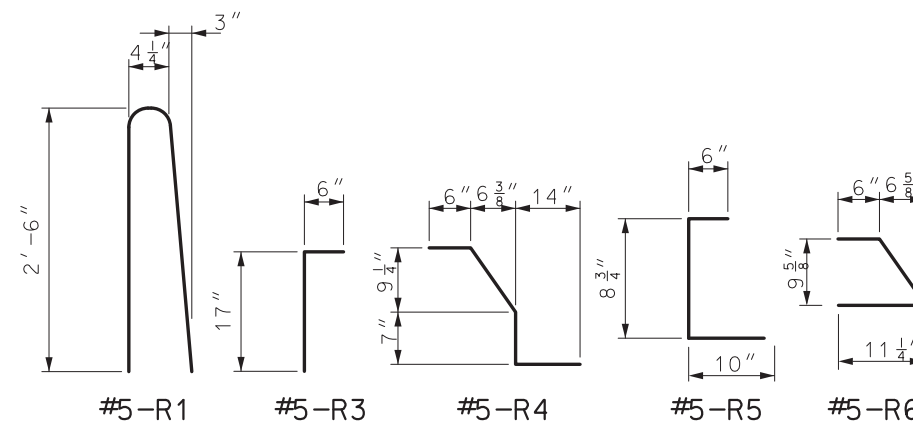
90° HOOKS



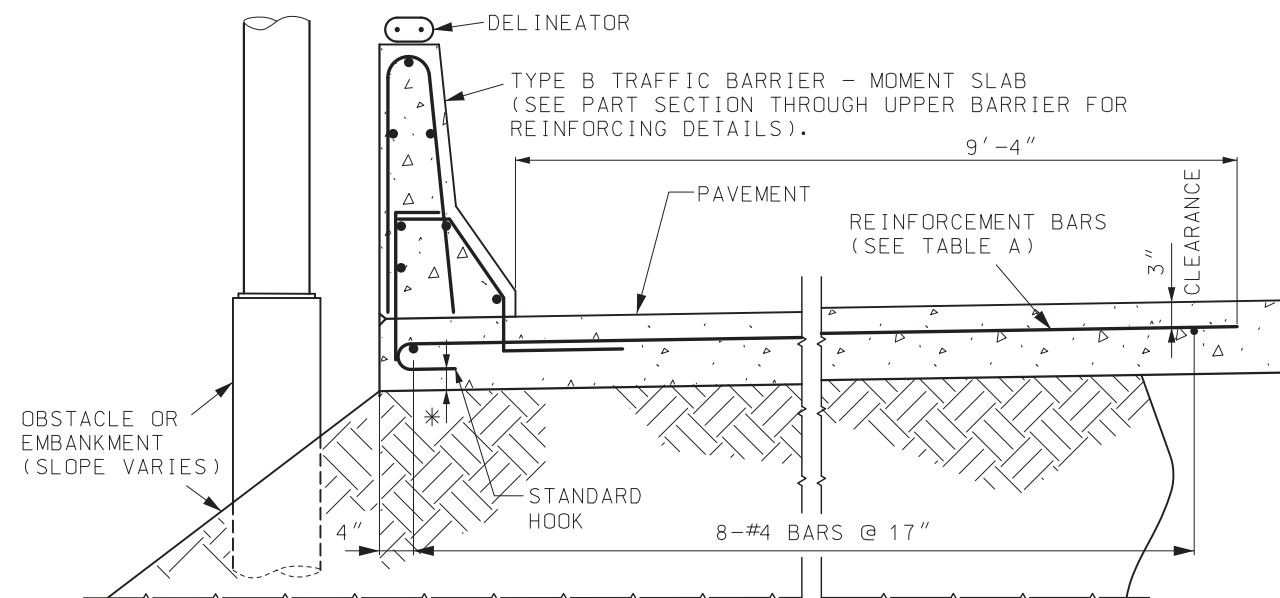
180° HOOKS



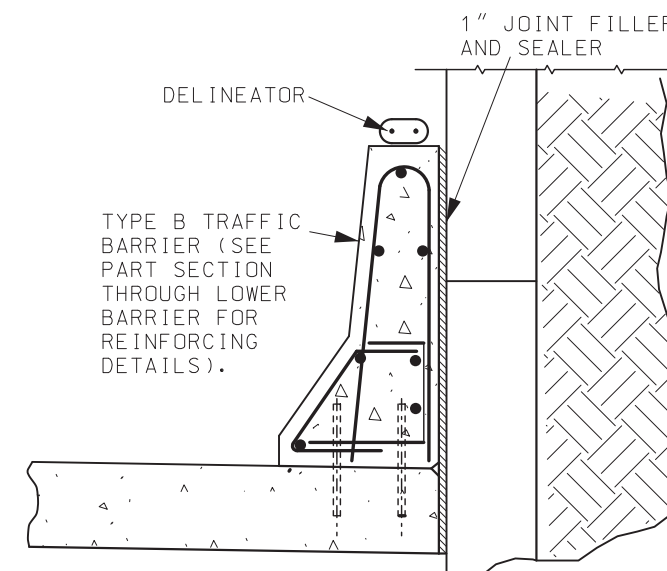
TYPE B TRAFFIC BARRIER ON TOP OF MSE WALL



#5-R1 #5-R3 #5-R4 #5-R5 #5-R6



TYPE B TRAFFIC BARRIER - MOMENT SLAB\*\*



TYPE B TRAFFIC BARRIER AT THE  
SIDE OF MSE WALL

#### GENERAL NOTES:

- ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.
- NO DIRECT PAYMENT WILL BE MADE FOR REINFORCING STEEL.
- MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2", UNLESS OTHERWISE SHOWN.

TYPE B (MODIFIED) SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.

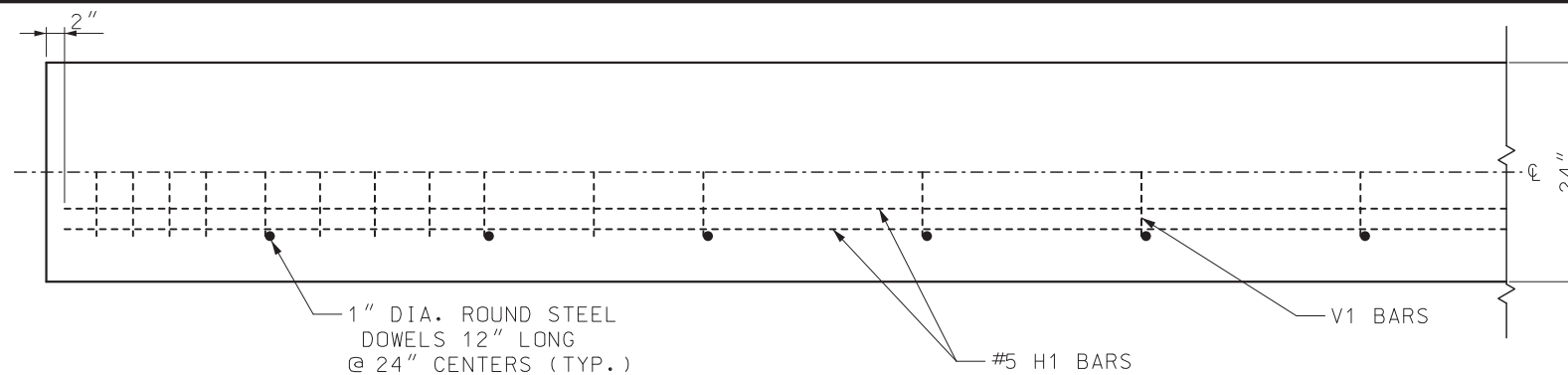
FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

\* TILT TRANSVERSE PAVEMENT REINFORCEMENT HOOKS FROM VERTICAL ALIGNMENT TO MAINTAIN 1 1/2" MINIMUM CLEARANCE.

\*\* SEE ROADWAY PAVEMENT DESIGN.

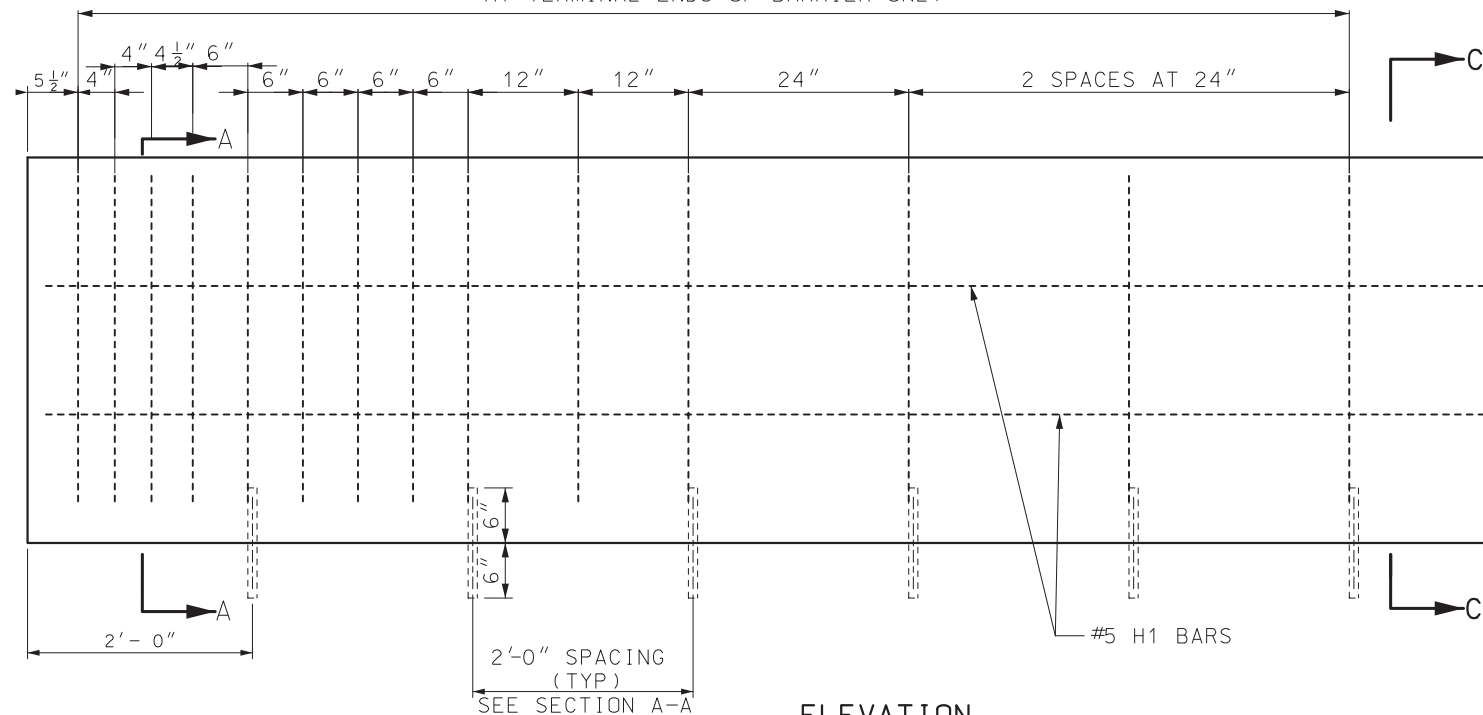
|                                                                                                          |  |                                                                                  |                                               |
|----------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------|-----------------------------------------------|
|                                                                                                          |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |                                               |
|                                                                                                          |  | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                               |
| <b>PERMANENT CONCRETE TRAFFIC BARRIER</b><br><b>TYPE B MODIFIED</b><br><b>AT MSE WALL OR MOMENT SLAB</b> |  | DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/28/2025                             | SHEET NO.<br><b>617.10N</b><br><b>3 OF 11</b> |



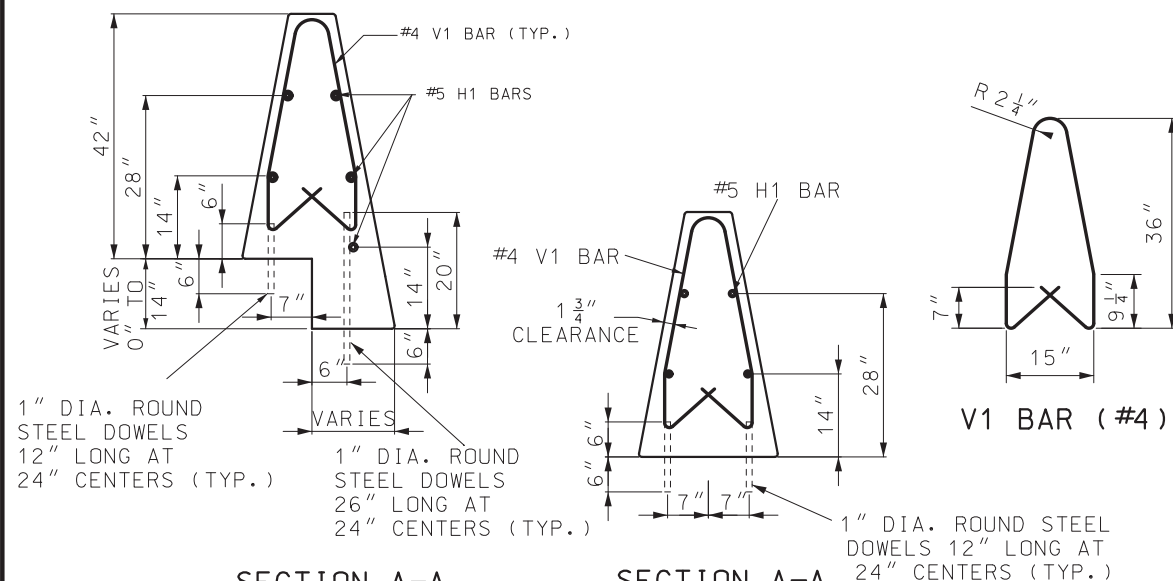


PLAN VIEW  
(SYMMETRICAL ABOUT CENTERLINE)

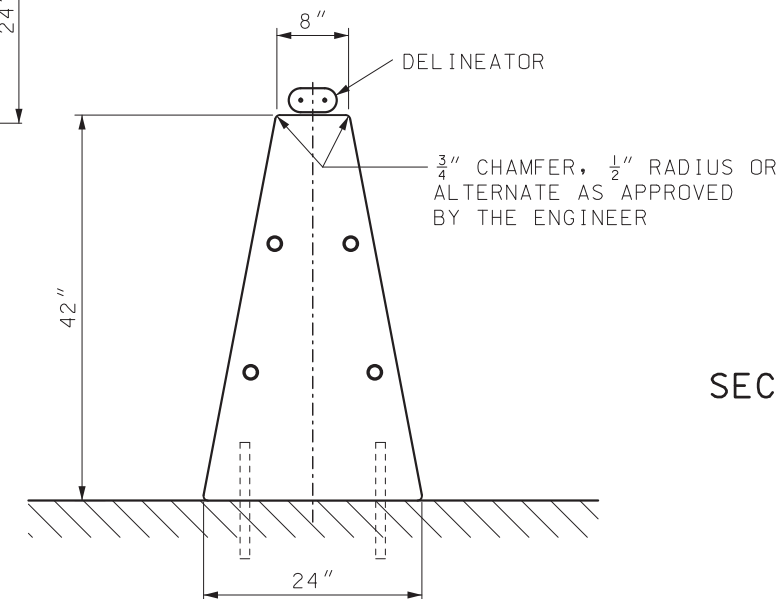
LIMITS OF #4 - V1 SPACED AS SHOWN BELOW  
AT TERMINAL ENDS OF BARRIER ONLY



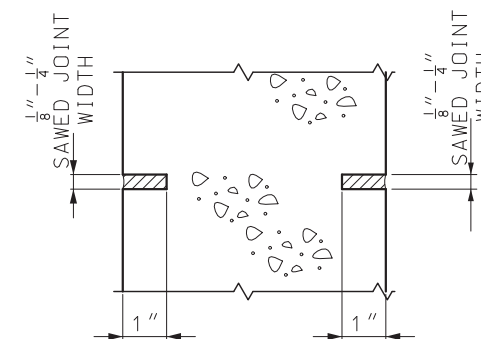
ELEVATION



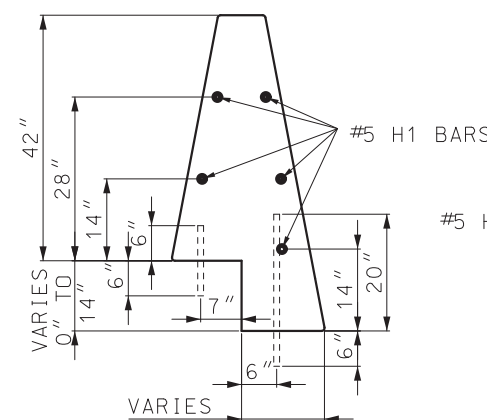
REINFORCING DETAILS



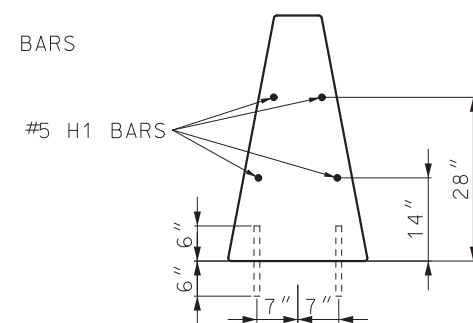
TYPE C  
TYPICAL SECTION



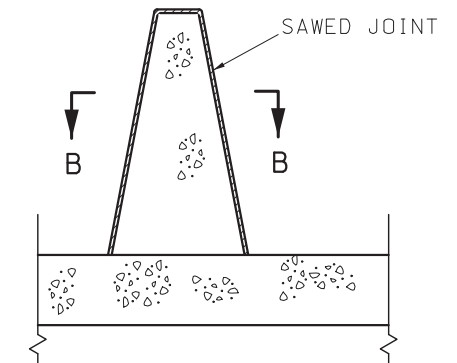
SECTION B-B



SECTION C-C  
(STEPPED PAVEMENT)



SECTION C-C  
(NORMAL PAVEMENT)



SECTION THROUGH SAWED JOINT

GENERAL NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

ANY METHOD DEvised BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ENSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED  $\pm 1/2$ " AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

ANCHORING DOWELS MAY BE OMITTED WHEN THE PLANS SPECIFY A MINIMUM 1 3/4" PAVEMENT SURFACE TO BE PLACED ABUTTING BOTH BARRIER FACES.

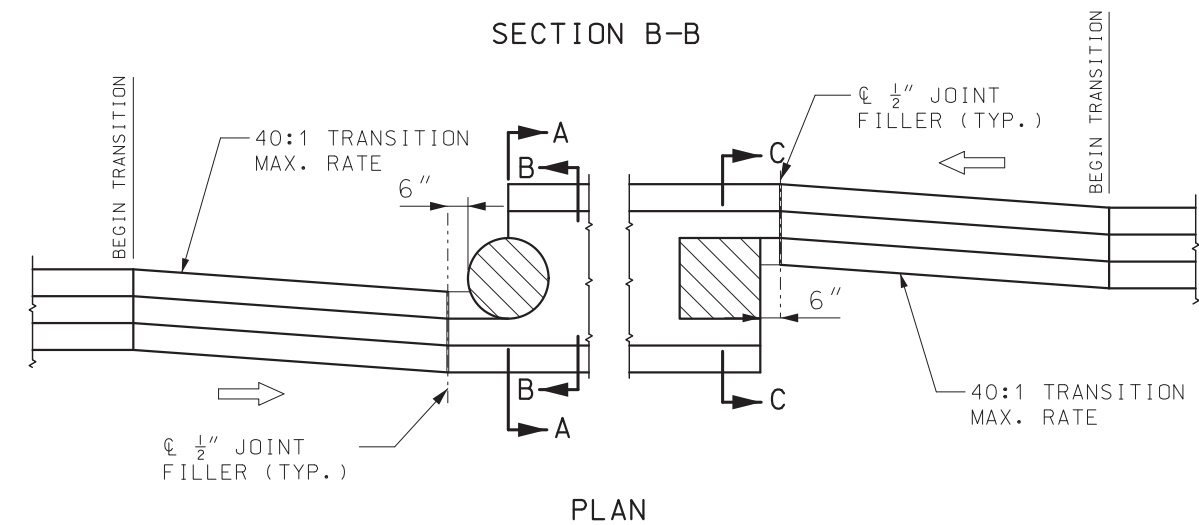
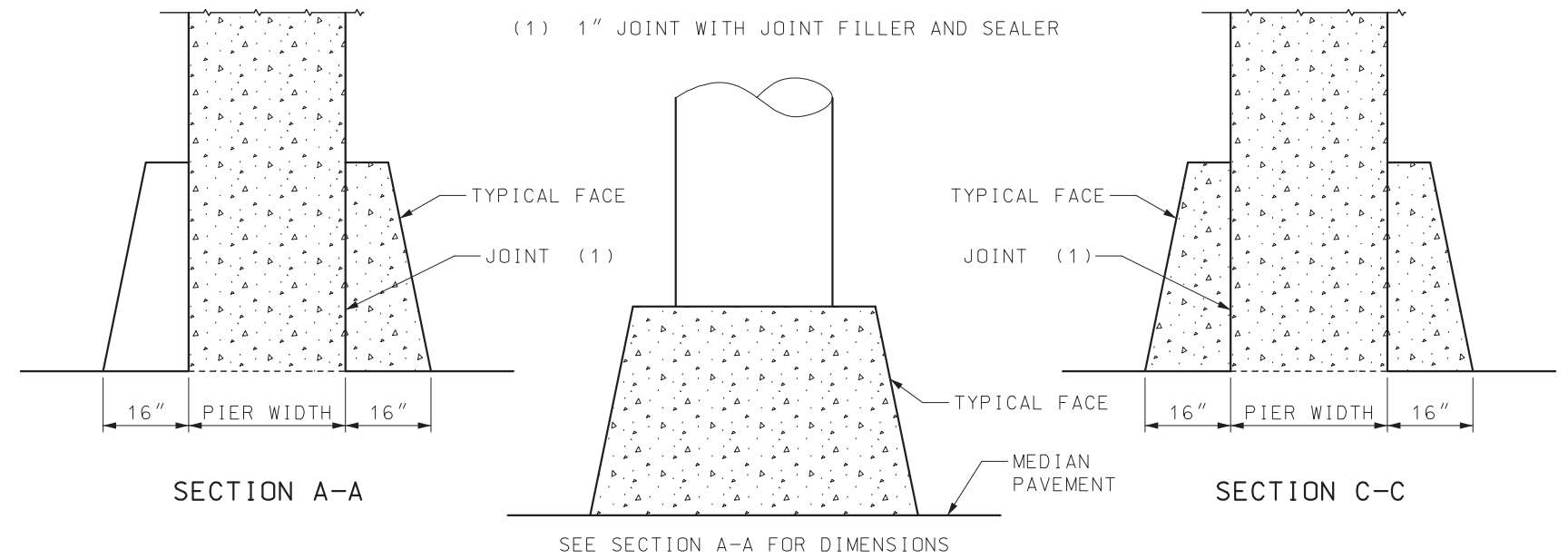
SAWED JOINTS SHALL BE LOCATED AT PAVEMENT TRANSVERSE JOINTS.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.

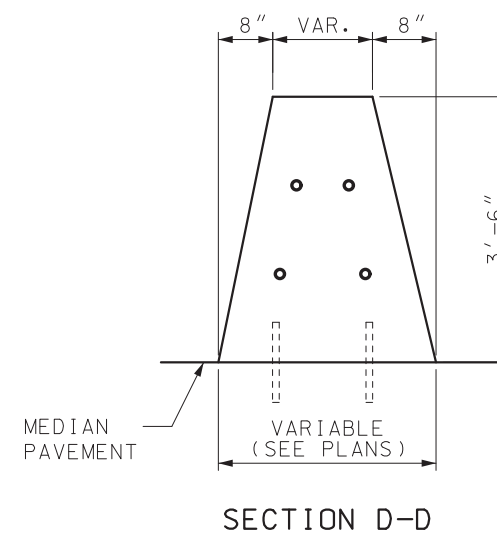
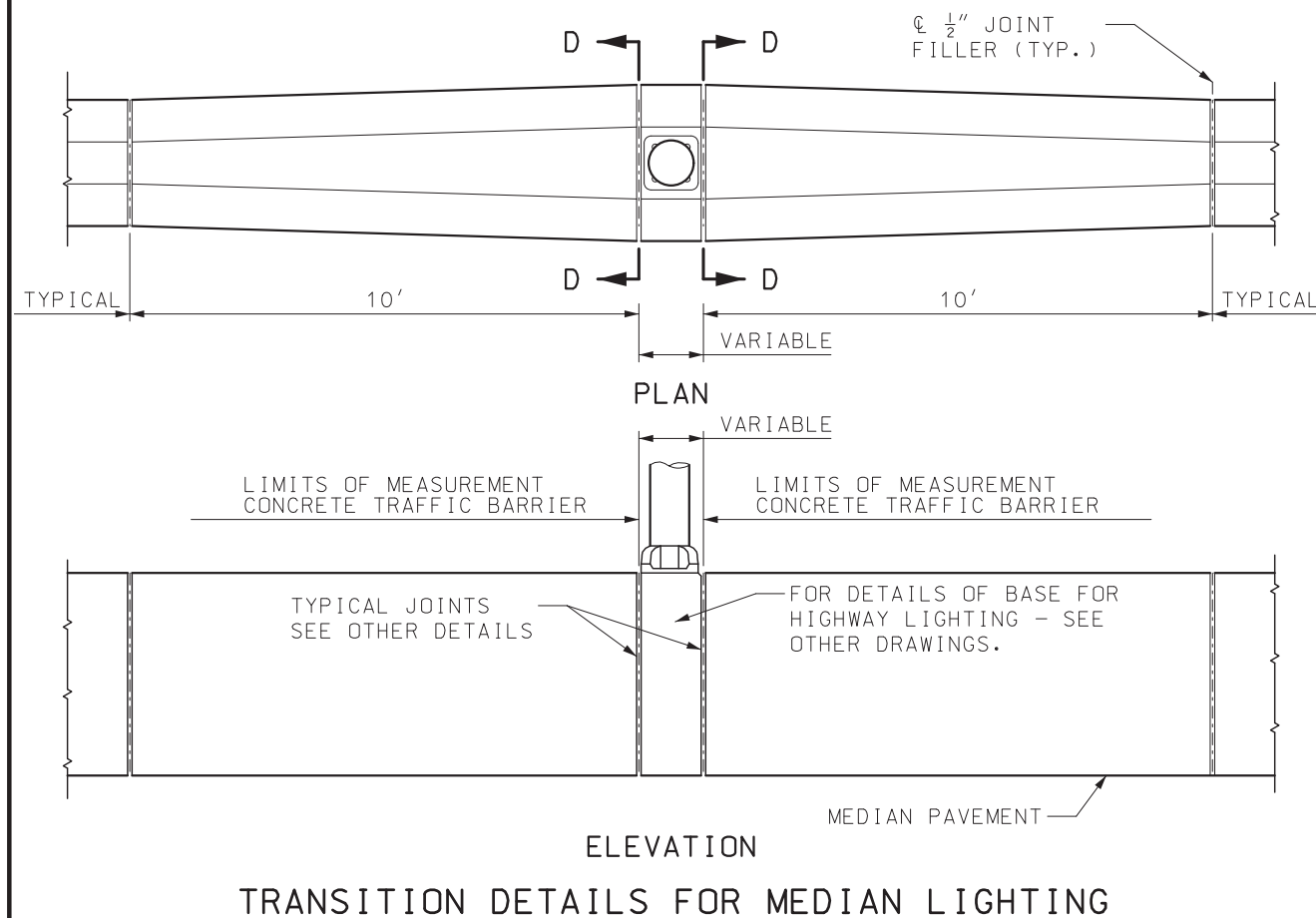
FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

|                                                                                                                                              |                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                                            |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                                            |
|                                                         | <b>PERMANENT CONCRETE TRAFFIC BARRIER</b><br><b>TYPE C</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/28/2025                                                                                         | SHEET NO.<br><b>617.10N</b><br><b>4 OF 11</b>              |





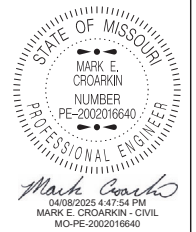
TRANSITION DETAILS FOR PIER PROTECTION

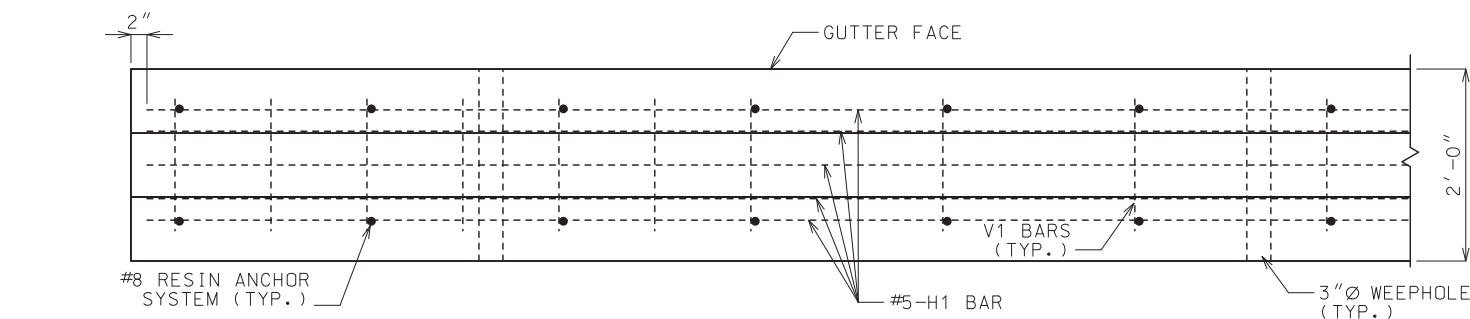


GENERAL NOTES:

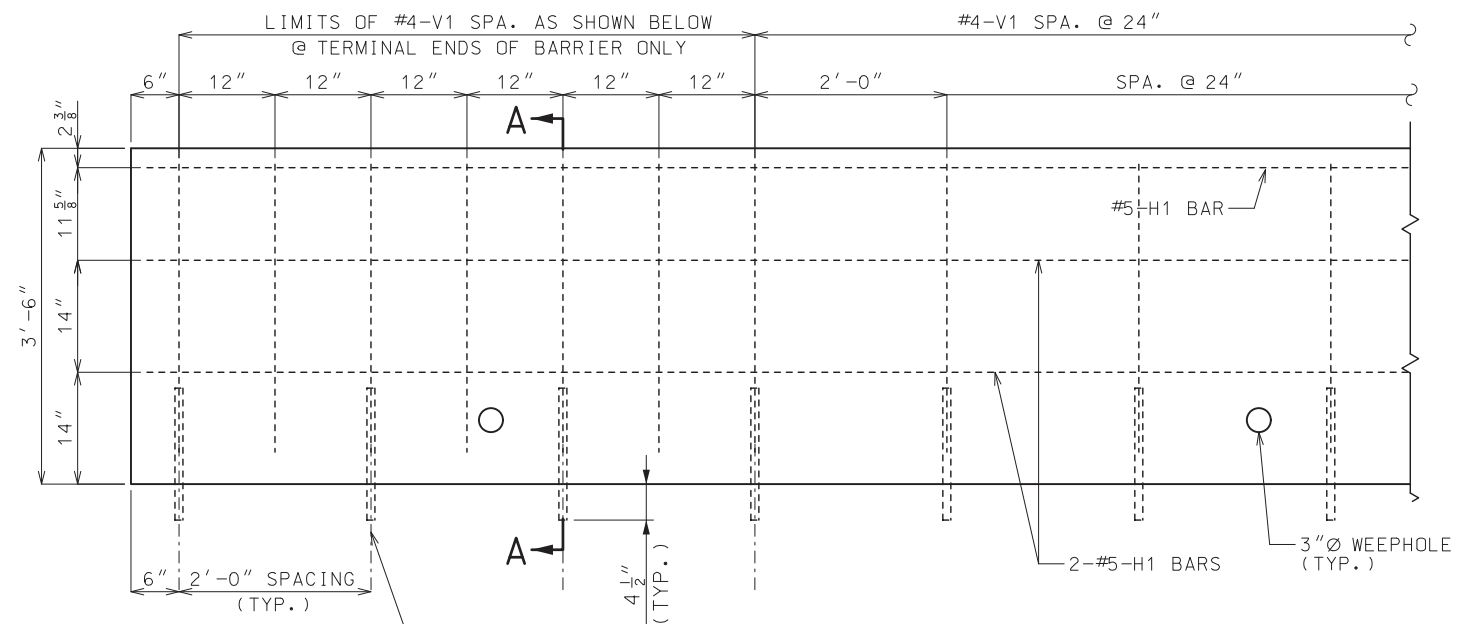
FOR DETAILS AND LOCATION OF DOWELS, SEE SHEET 4.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.

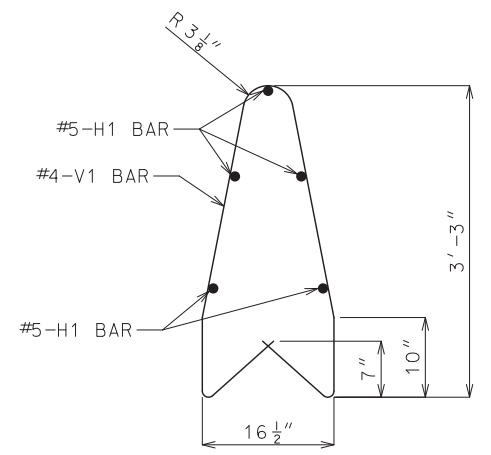
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|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                            |
|                                                                                                                                             | <b>PERMANENT CONCRETE TRAFFIC BARRIER</b><br><b>TYPE C</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/28/2025                                                                                                                                                                             | SHEET NO.<br><b>617.10N</b><br><b>5 OF 11</b>              |



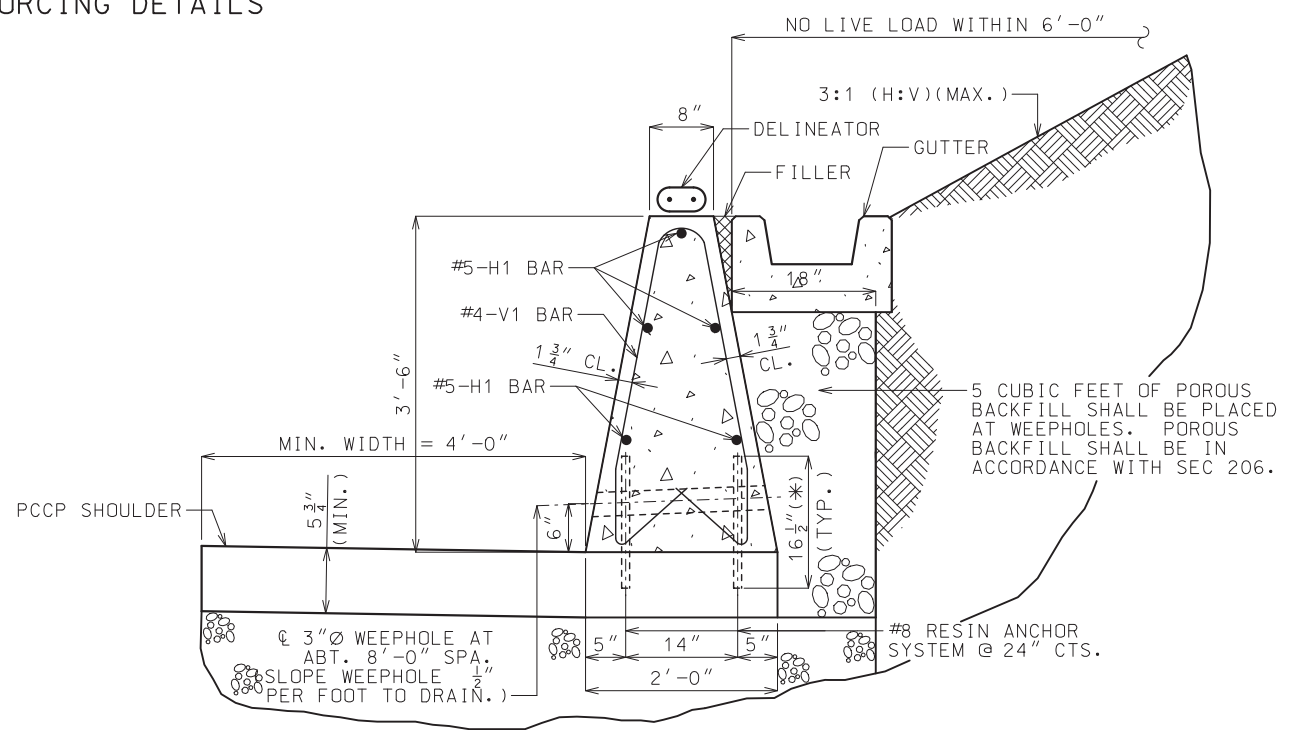
PLAN VIEW  
NOTE: GUTTER NOT SHOWN FOR CLARITY.



ELEVATION  
REINFORCING DETAILS



V1 BAR (#4)



SECTION A-A  
(FOR SLOPING AND NONSLOPING BACKSLOPE)

GENERAL NOTES:

CONCRETE SHALL BE CLASS B  $f'c = 4,000$  PSI.

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

ANGLE OF INTERNAL FRICTION,  $\phi_f \geq 27^\circ$  FOR BACKFILL MATERIAL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ " , UNLESS OTHERWISE SHOWN.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OR THE BAR.

ANY METHOD DEvised BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ENSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED  $\pm\frac{1}{2}$ " AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATIONS.

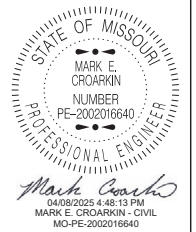
SAWED JOINTS SHALL BE SPACED AT 15'-0". SEE OTHER STANDARD PLANS FOR SAWED JOINT DETAIL.

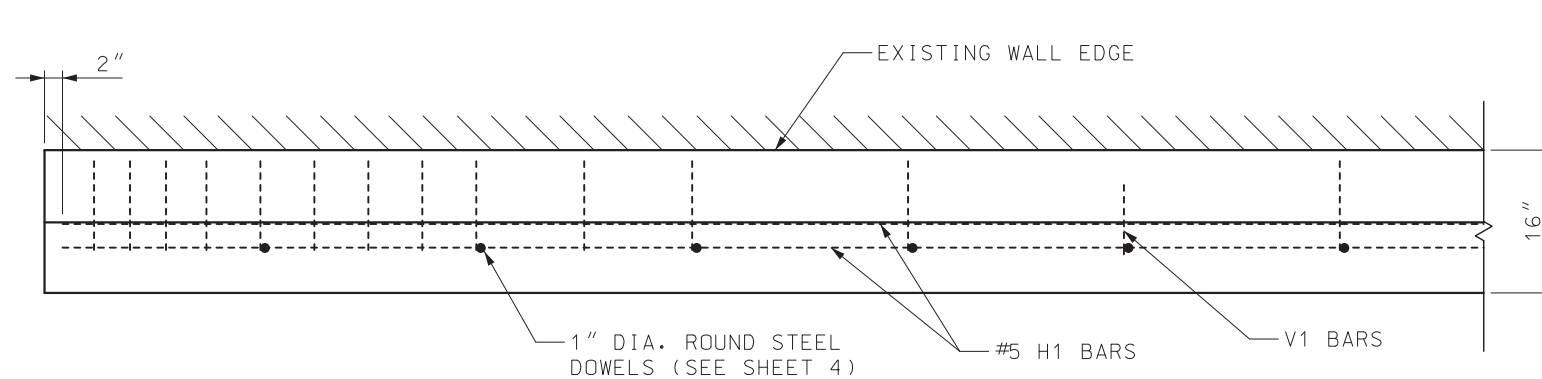
TYPE C BARRIER MODIFIED RETAINING WALL WITH NONMOMENT SLAB SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

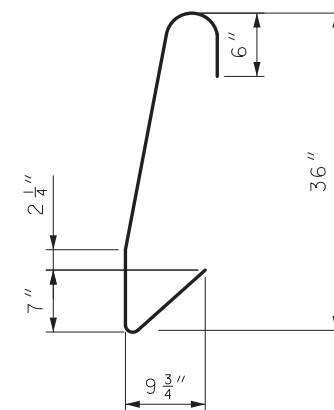
RESIN ANCHOR SYSTEM SHALL BE DRILLED IN THE PAVEMENT.

WHEN BARRIER HEIGHT EXCEEDS 42" OR SLOPE EXCEEDS 3:1 (H:V) OR LIVE LOAD IS WITHIN 6'-0", CONTACT BRIDGE DIVISION FOR SPECIAL DESIGN.

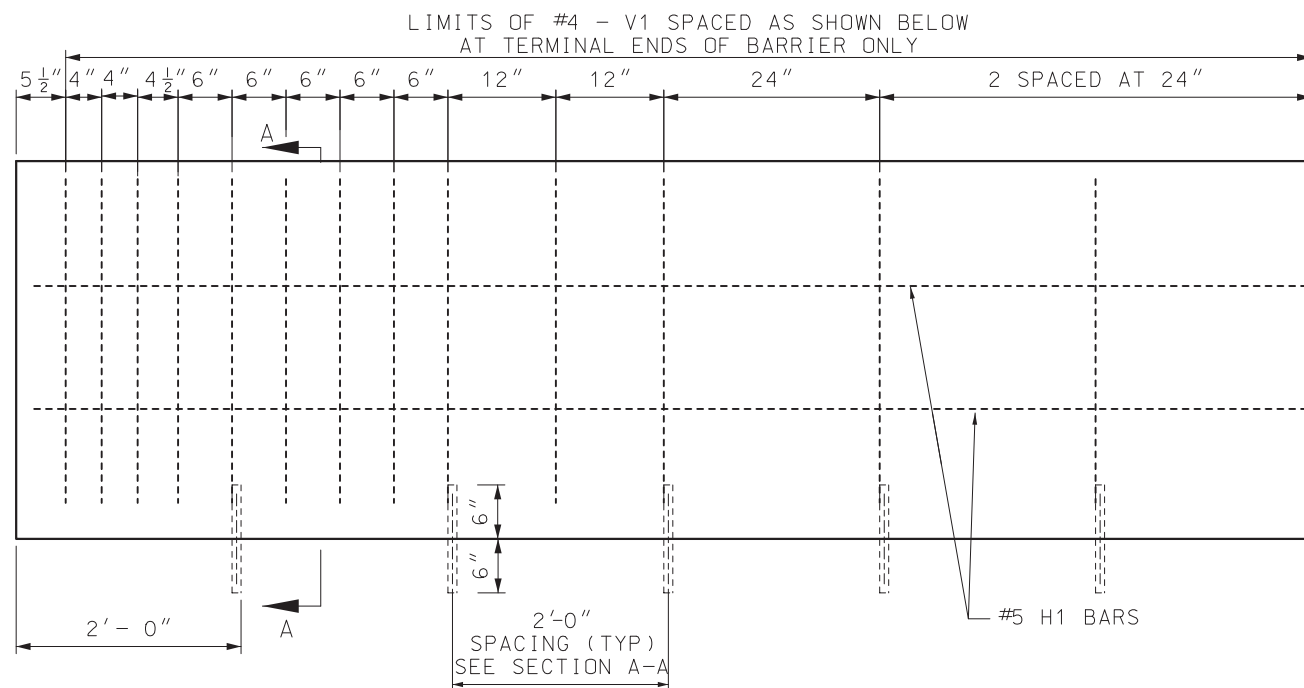
|                                                                                                                                                                                                                                  |                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                              |
|                                                                                                                                             | <b>PERMANENT CONCRETE TRAFFIC BARRIER</b><br><b>TYPE C AS RETAINING WALL</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/28/2025                                                                                                                                                                             | <b>617.10N</b>                                                               |
| SHEET NO.<br><b>6 OF 11</b>                                                                                                                                                                                                      |                                                                              |



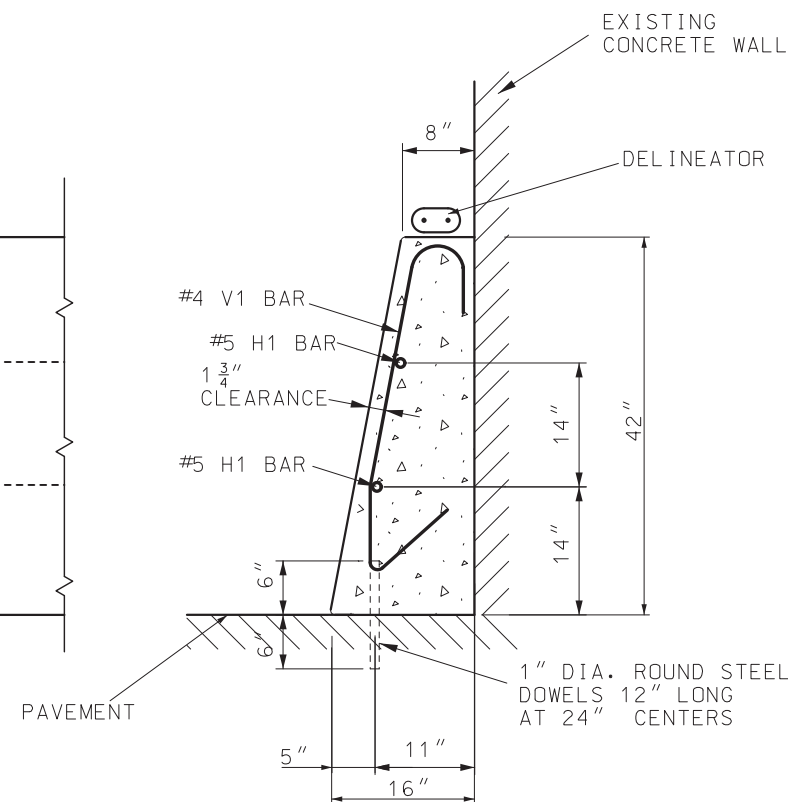
PLAN VIEW



V1 BAR (#4)



ELEVATION  
REINFORCING DETAILS



SECTION A-A

GENERAL NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

ANY METHOD DEvised BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ENSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED  $\pm \frac{1}{2}$ " AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATIONS.

SAWED JOINTS SHALL BE LOCATED AT PAVEMENT TRANSVERSE JOINTS.

TYPE D SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

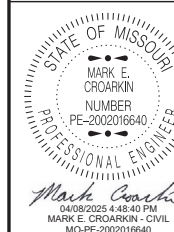
#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

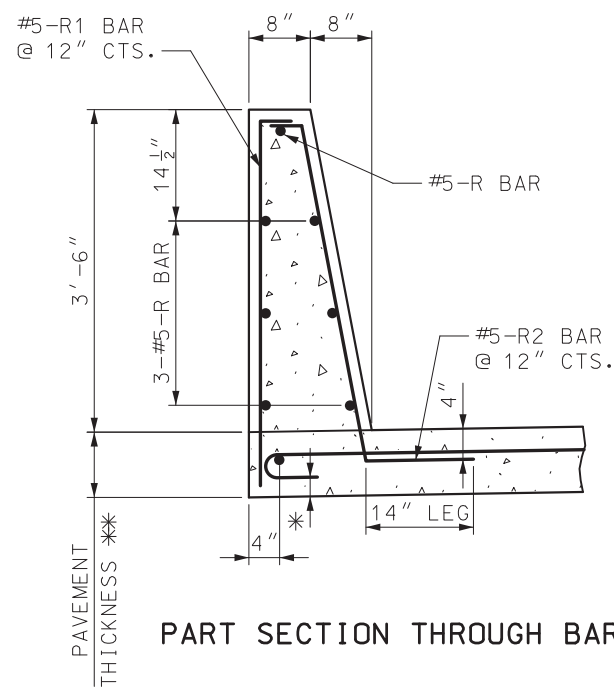


PERMANENT CONCRETE  
TRAFFIC BARRIER  
TYPE D

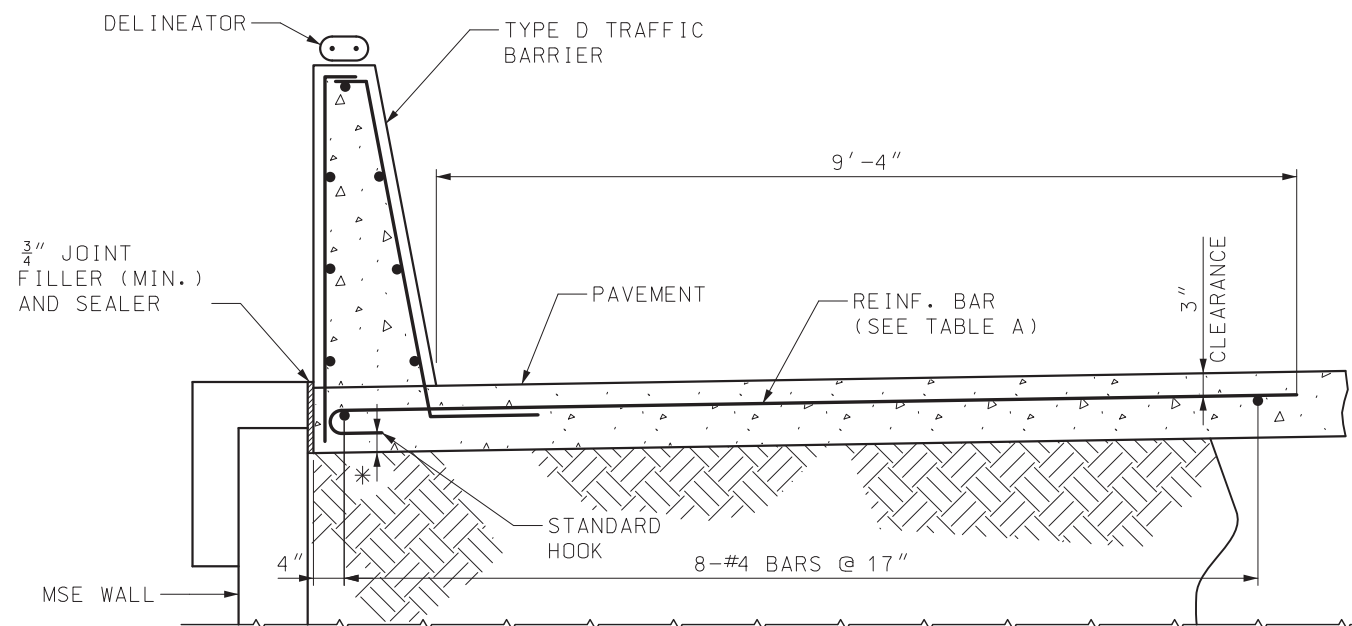
DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/28/2025

617.10N

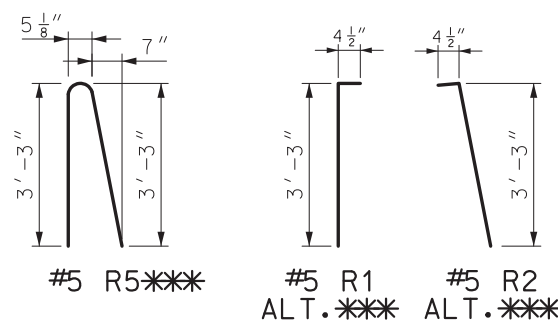
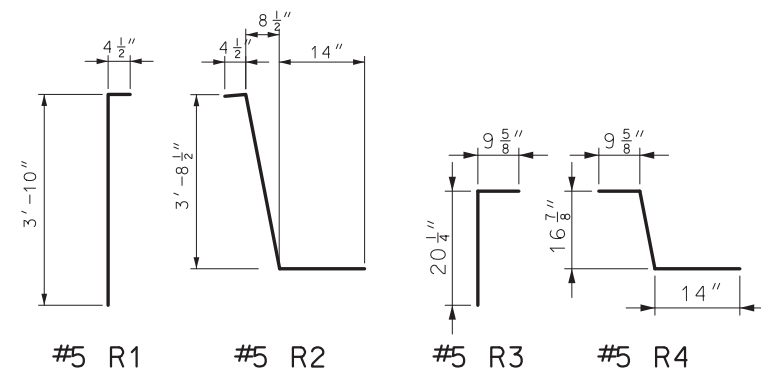
SHEET NO.  
7 OF 11



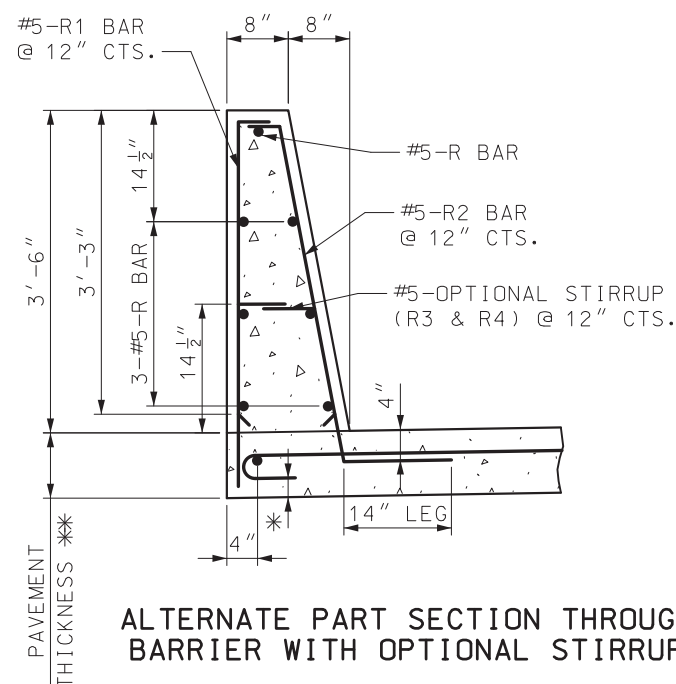
PART SECTION THROUGH BARRIER



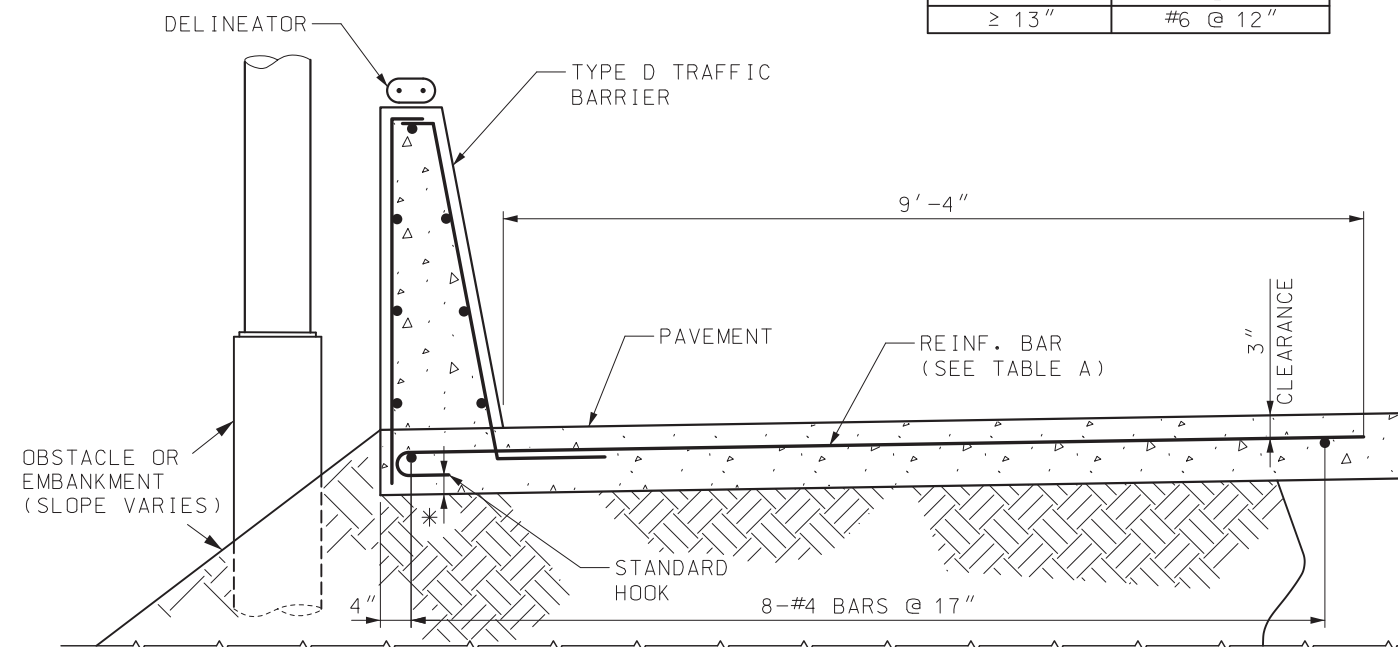
TYPE D TRAFFIC BARRIER ON TOP OF MSE WALL



| TABLE A<br>TRANSVERSE PAVEMENT<br>REINFORCEMENT |                          |
|-------------------------------------------------|--------------------------|
| PAVEMENT<br>THICKNESS<br>**                     | BAR SIZE<br>&<br>SPACING |
| 8"                                              | #5 @ 4"*                 |
| 9"                                              | #5 @ 5"*                 |
| 10"                                             | #5 @ 6"                  |
| 11"                                             | #5 @ 7"                  |
| 12"                                             | #6 @ 12"                 |
| ≥ 13"                                           | #6 @ 12"                 |

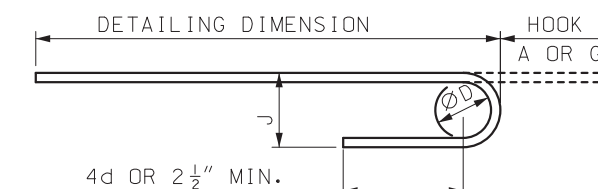
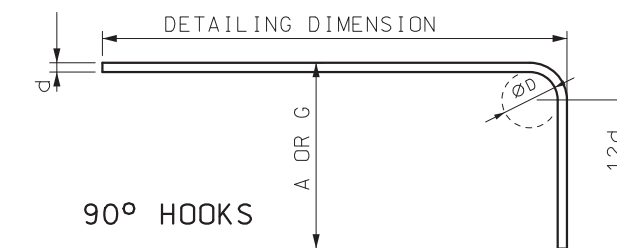


ALTERNATE PART SECTION THROUGH BARRIER WITH OPTIONAL STIRRUP



TYPE D TRAFFIC BARRIER - MOMENT SLAB\*\*

| END HOOK DIMENSIONS |            |            |           |        |
|---------------------|------------|------------|-----------|--------|
| BAR<br>SIZE         | D<br>(IN.) | ALL GRADES |           |        |
|                     |            | 180° HOOKS | 90° HOOKS |        |
|                     |            | A OR G     | J         | A OR G |
| #5                  | 3 3/4"     | 7"         | 5"        | 10"    |
| #6                  | 4 1/2"     | 8"         | 6"        | 12"    |



180° HOOKS

ALL STANDARD HOOKS AND BENDS OTHER THAN 180° TO BE BENT WITH THE SAME PROCEDURE AS FOR 90° STANDARD HOOKS.

GENERAL NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

NO DIRECT PAYMENT WILL BE MADE FOR REINFORCING STEEL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2" UNLESS OTHERWISE SHOWN.

TYPE D SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

\* TILT TRANSVERSE PAVEMENT REINFORCEMENT HOOKS FROM VERTICAL ALIGNMENT TO MAINTAIN 1 1/2" MINIMUM CLEARANCE.

\*\* SEE ROADWAY PAVEMENT DESIGN.

\*\*\* R1 AND R2 MAY BE REPLACED WITH ALTERNATE (3'-3") R1 AND R2 OR R5 ONLY FOR USE WITH OPTIONAL STIRRUP.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PERMANENT CONCRETE TRAFFIC BARRIER**

**TYPE D ATOP MSE WALL AND MOMENT SLAB**



04/08/2025 4:40:10 PM  
MARK E. CROARKIN - CIVIL  
MO-PE-2002016640

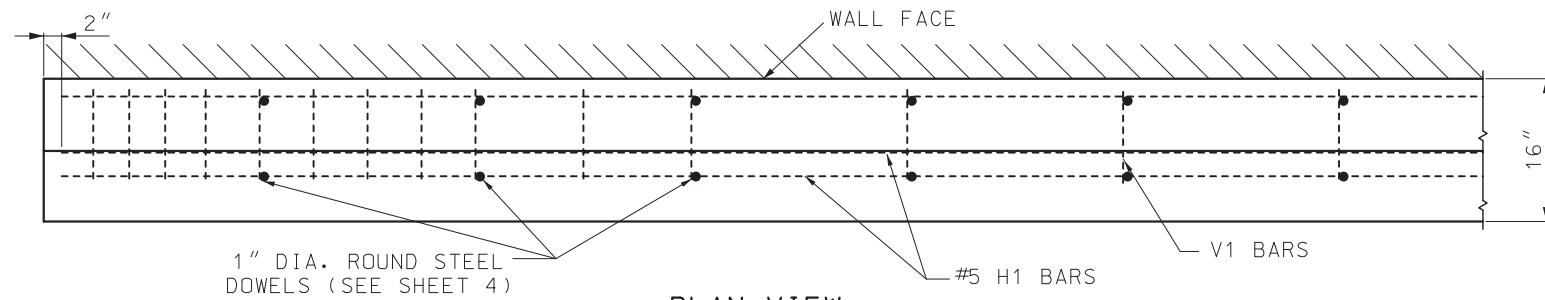
**DATE EFFECTIVE:** 7/1/2025

**DATE PREPARED:** 3/28/2025

**617.10N**

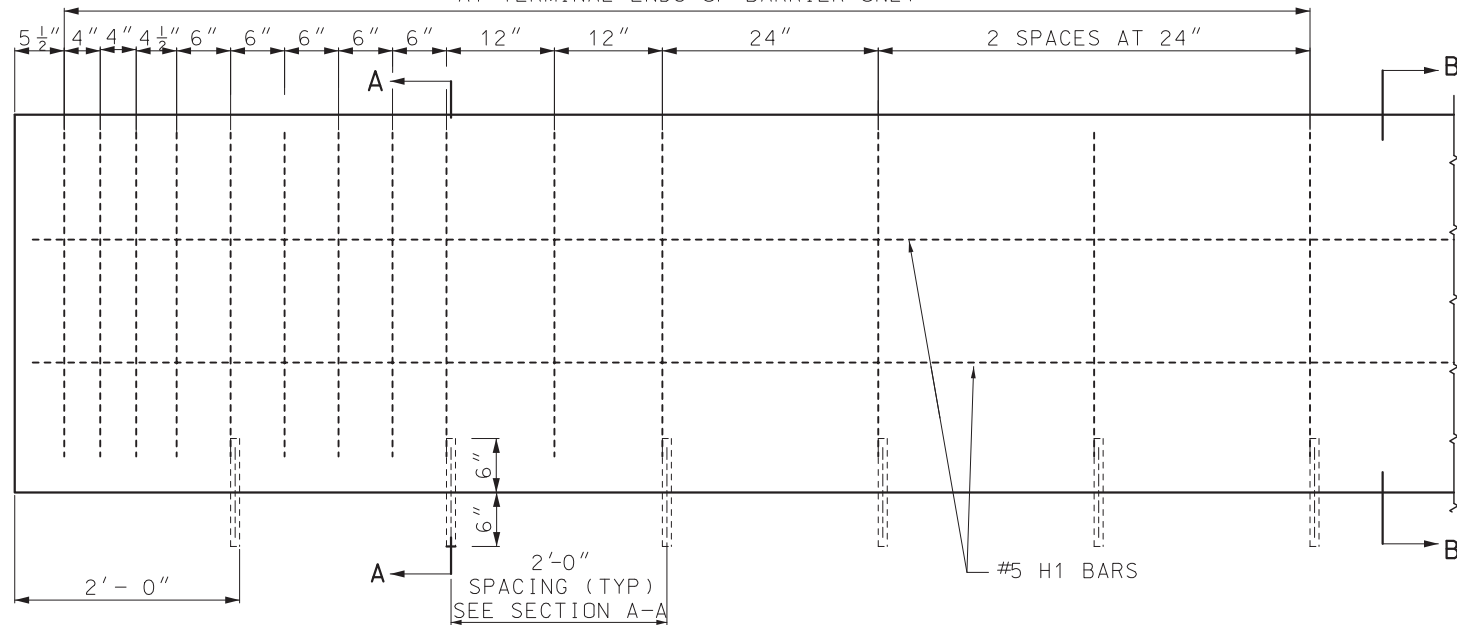
**SHEET NO.**

**8 OF 11**

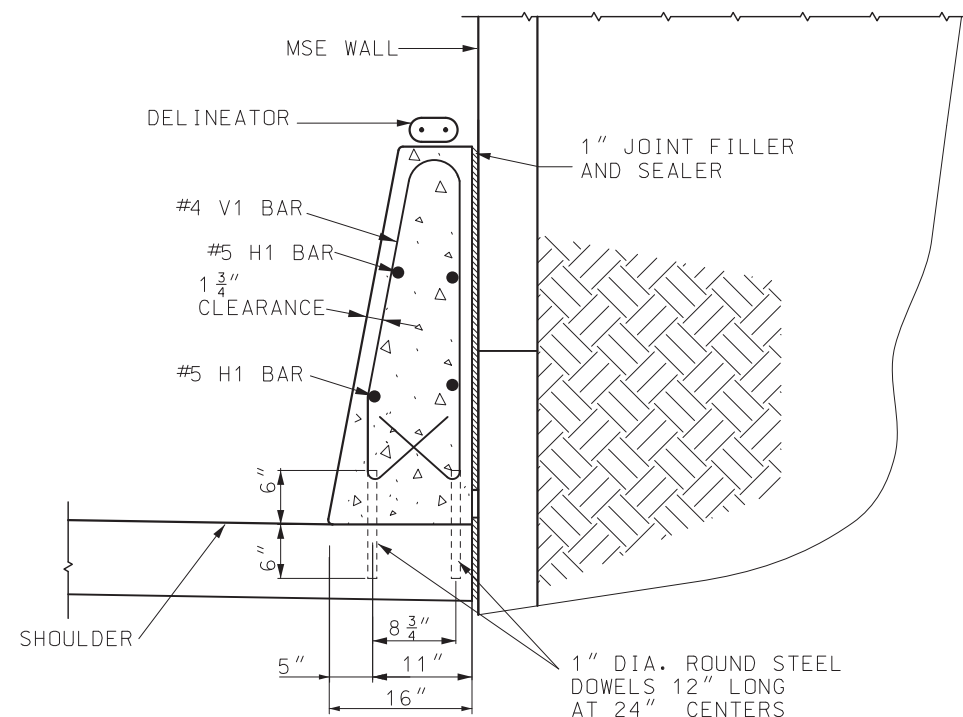


PLAN VIEW

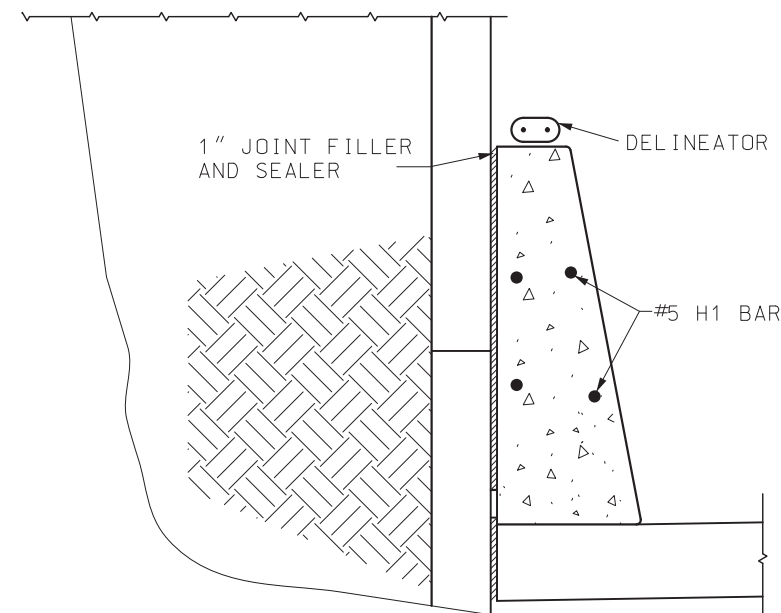
LIMITS OF #4 - V1 SPACED AS SHOWN BELOW  
AT TERMINAL ENDS OF BARRIER ONLY



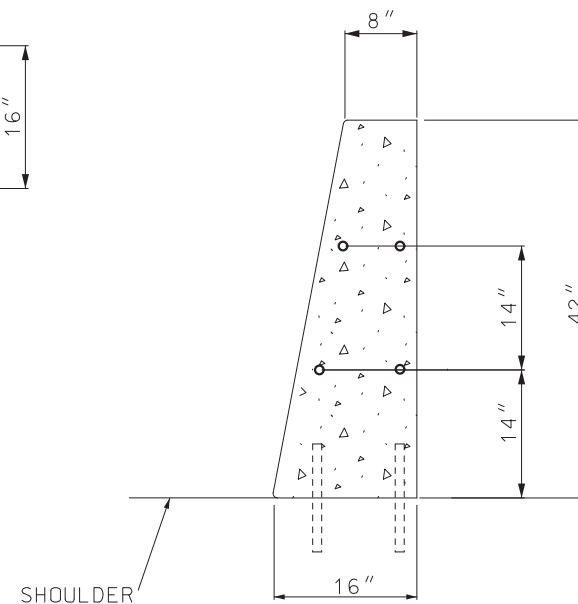
ELEVATION  
REINFORCING DETAILS



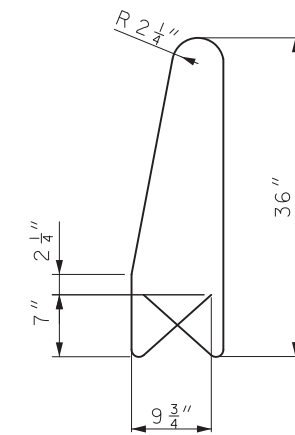
SECTION A-A



SECTION B-B



TYPE D TYPICAL SECTION



V1 BAR (#4)

GENERAL NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2", UNLESS OTHERWISE SHOWN.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

ANY METHOD DEvised BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ENSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED ±1/2" AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATIONS.

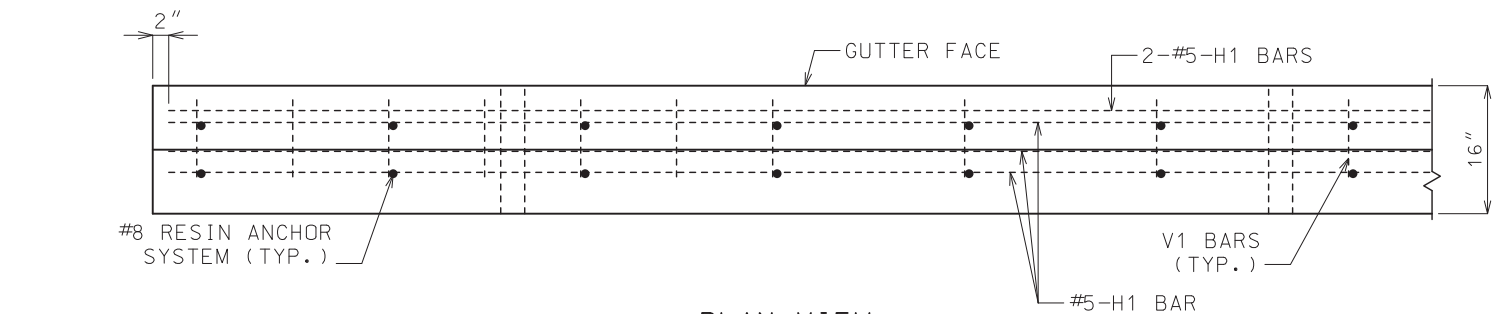
SAWED JOINTS SHALL BE SPACED AT 15'-0". SEE OTHER STANDARD PLANS FOR SAWED JOINT DETAIL.

TYPE D SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

#8 REINFORCING BARS WITH AN EPOXY ANCHOR SYSTEM MAY BE SUBSTITUTED FOR SMOOTH 1" DIAMETER ROUND STEEL DOWELS.

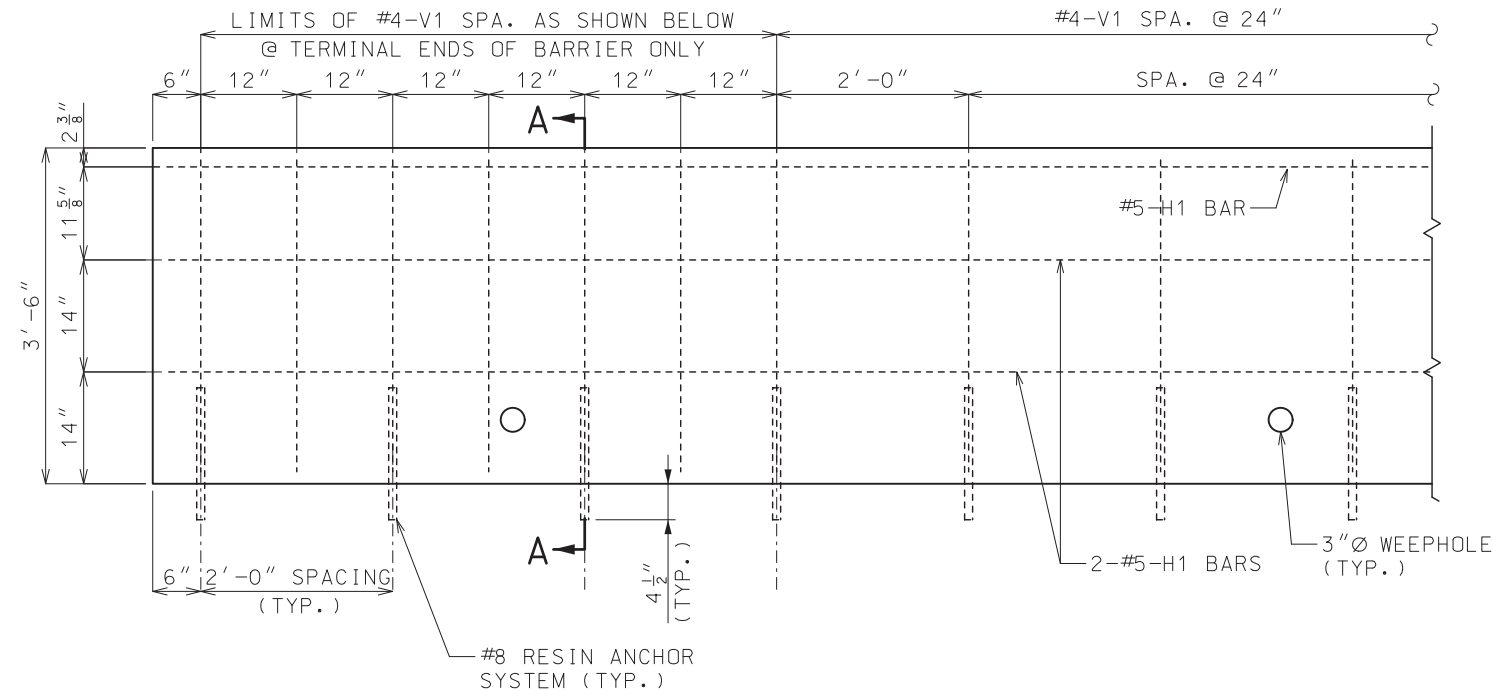
FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

|                                                                                                                                                                                                                                  |                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                            |
|                                                                                                                                             | <b>PERMANENT CONCRETE TRAFFIC BARRIER</b><br><b>TYPE D BESIDE MSE WALL</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/28/2025                                                                                                                                                                             | 617.10N<br>SHEET NO. 9 OF 11                                               |

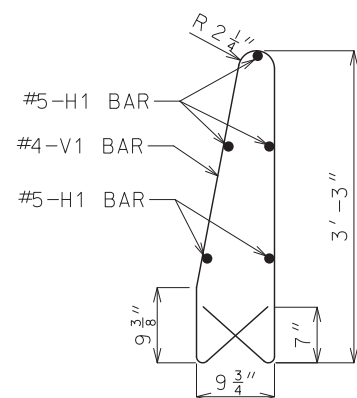


PLAN VIEW

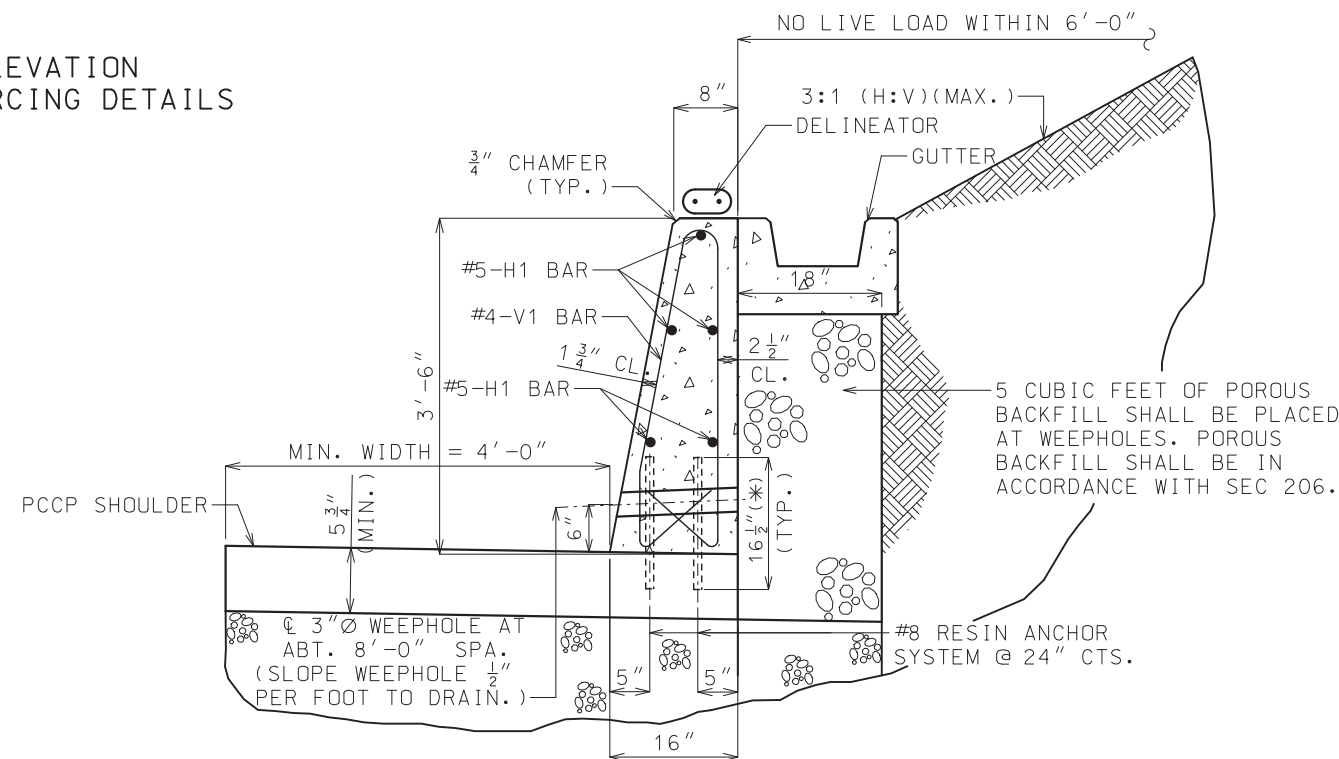
NOTE: GUTTER NOT SHOWN FOR CLARITY.



ELEVATION  
REINFORCING DETAILS



V1 BAR (#4)



SECTION A-A  
(FOR SLOPING AND NONSLOPING BACKSLOPE)

GENERAL NOTES:

CONCRETE SHALL BE CLASS B  $f'_c = 4,000$  PSI.

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

ANGLE OF INTERNAL FRICTION,  $\phi_f \geq 30^\circ$  FOR BACKFILL MATERIAL.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}"$ , UNLESS OTHERWISE SHOWN.

BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OR THE BAR.

ANY METHOD DEvised BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ENSURE THE LONGITUDINAL REINFORCING STEEL WILL BE POSITIONED  $\pm\frac{1}{2}"$  AS DIMENSIONED WILL BE SATISFACTORY.

THE CONTRACTOR HAS THE OPTION TO SLIP-FORM THE BARRIER. IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

THIS BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

THIS BARRIER SHALL NOT BE USED FOR BRIDGE ROADWAY APPLICATION.

SAWED JOINTS SHALL BE SPACED AT 15'-0". SEE OTHER STANDARD PLANS FOR SAWED JOINT DETAIL.

TYPE D BARRIER MODIFIED RETAINING WALL WITH NONMOMENT SLAB SHALL BE USED ONLY AT LOCATIONS SHOWN ON PLANS.

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

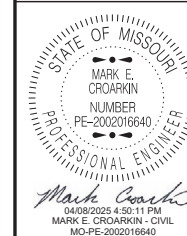
RESIN ANCHOR SYSTEM SHALL BE DRILLED IN THE PAVEMENT.

WHEN BARRIER HEIGHT EXCEEDS 42" OR SLOPE EXCEEDS 3:1 (H:V) OR LIVE LOAD IS WITHIN 6'-0", CONTACT BRIDGE DIVISION FOR SPECIAL DESIGN.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



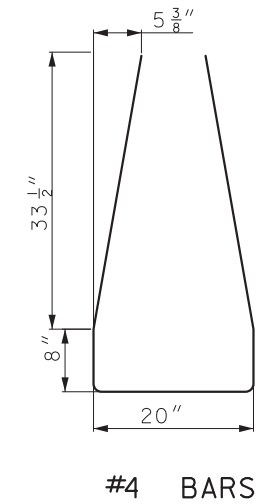
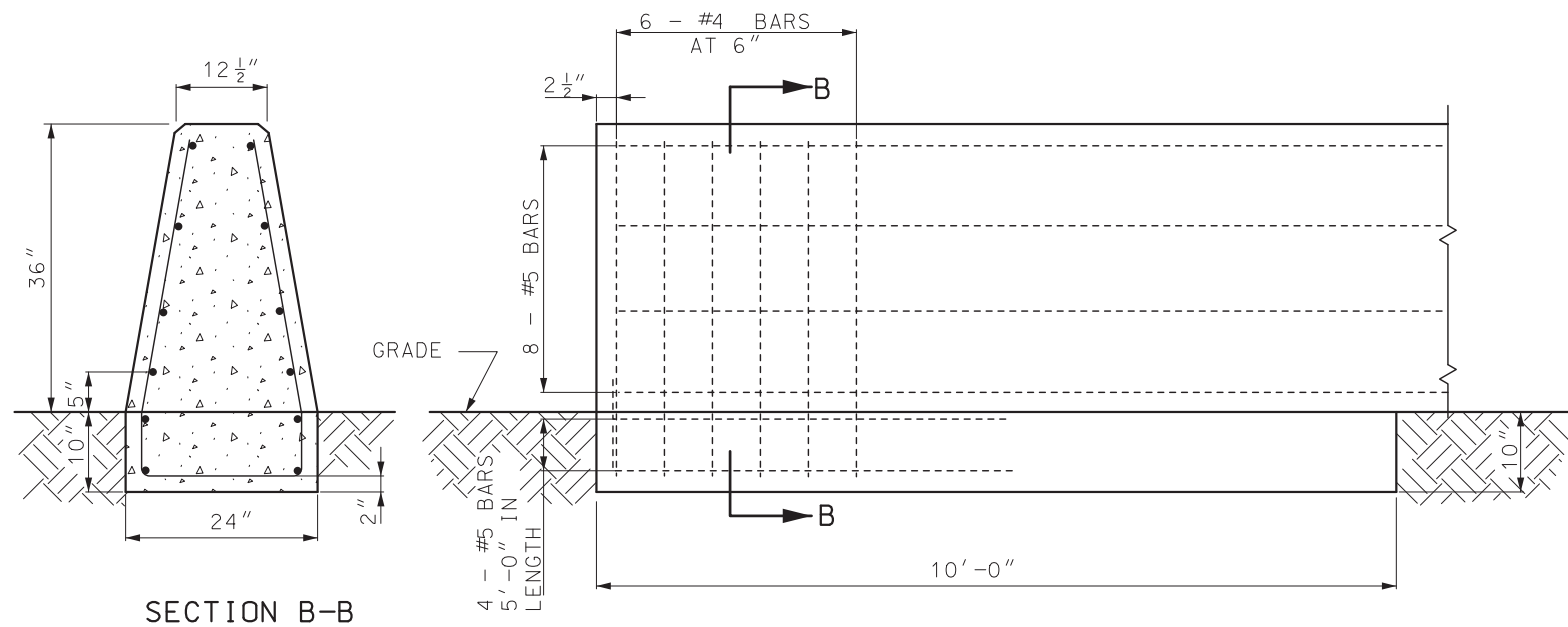
PERMANENT CONCRETE  
TRAFFIC BARRIER  
TYPE D AS RETAINING WALL

DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/28/2025

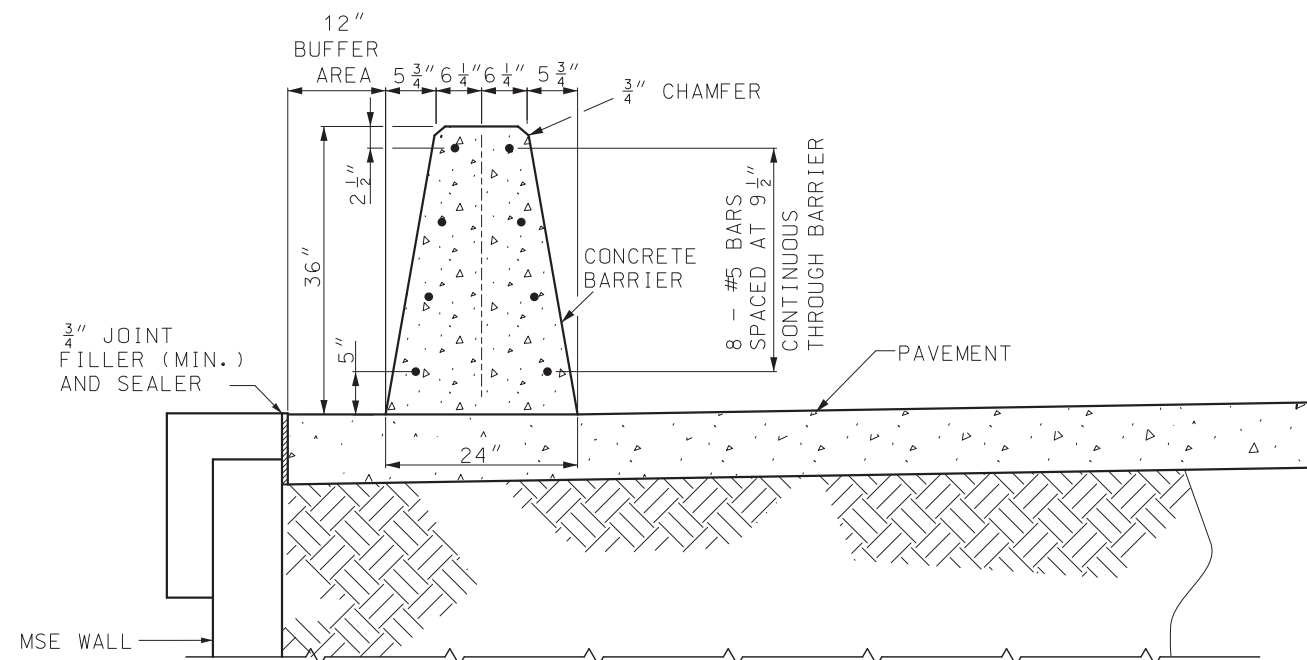
617.10N

SHEET NO.  
10 OF 11





CONCRETE BARRIER END ANCHORAGE ON GRADE



TRAFFIC BARRIER ON TOP OF MSE WALL

GENERAL NOTES:

ALL REINFORCEMENT SHALL BE GRADE 60 EPOXY COATED.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2", UNLESS OTHERWISE SHOWN.

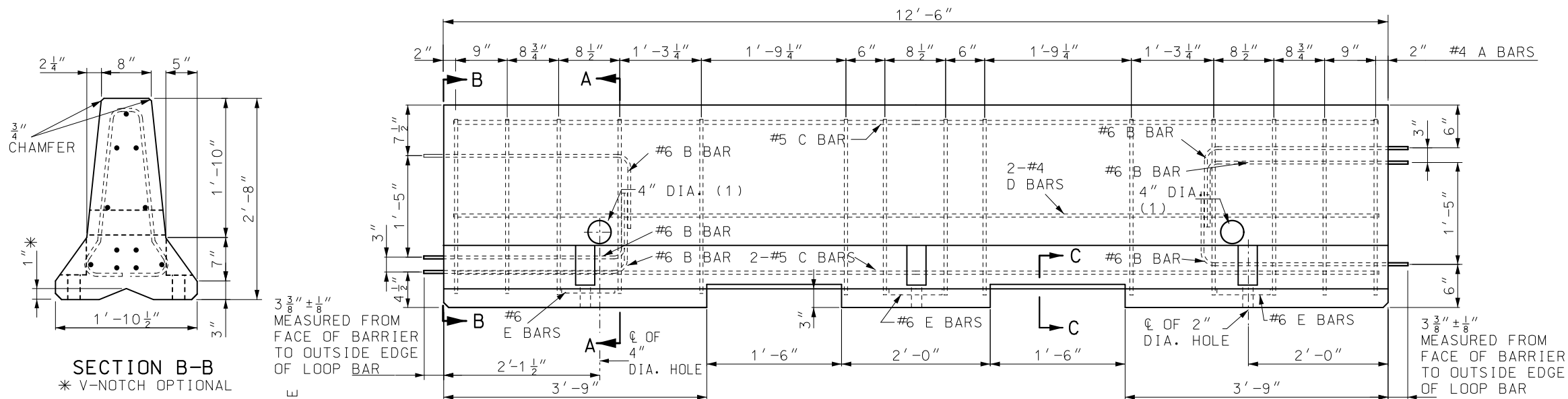
BAR SPLICES SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.

A 12" BUFFER REQUIRED WITHIN THE LIMITS OF THE TRAFFIC BARRIER EXCLUDING THE END ANCHORAGE SECTIONS.

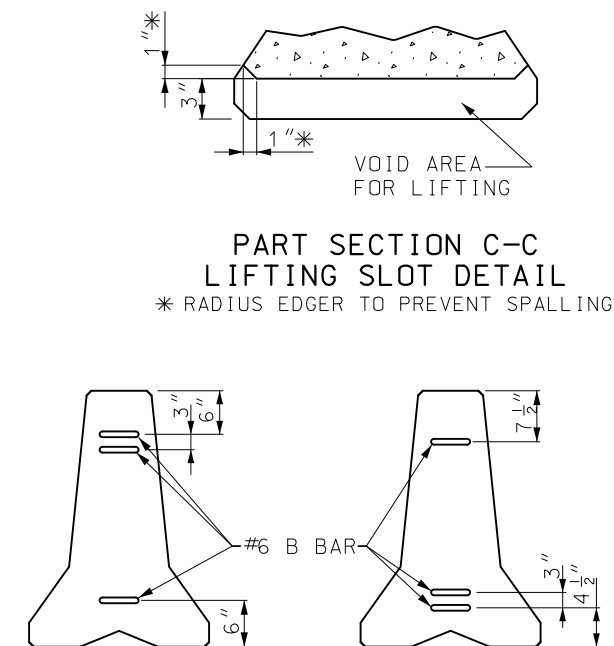
PAVEMENT SURFACE DIFFERENTIAL SHALL NOT EXCEED 1 1/2".

FOR CONCRETE TRAFFIC BARRIER DELINEATION DETAILS, SEE STD PLAN 903.00.

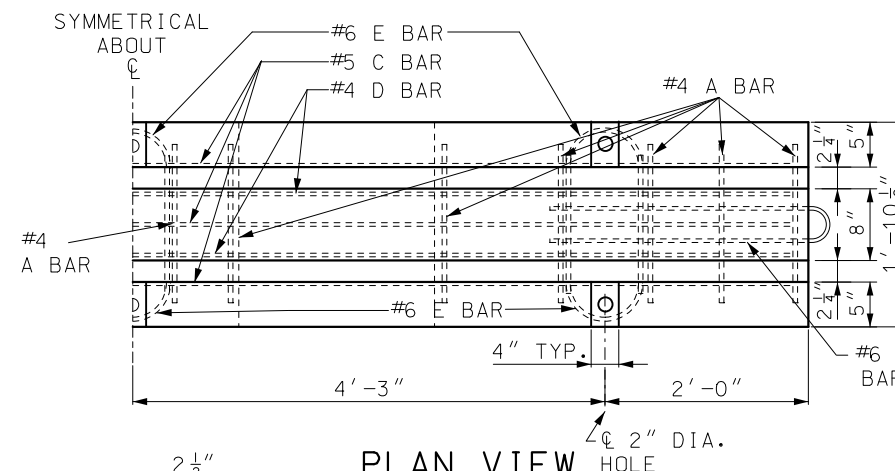
|                                                                                                                                                                                                                                  |                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                          |
|                                                                                                                                             | <b>PERMANENT CONCRETE TRAFFIC BARRIER</b><br><b>TYPE E ATOP MSE WALL</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/28/2025                                                                                                                                                                             | 617.10N                                                                  |
| SHEET NO. 11 OF 11                                                                                                                                                                                                               |                                                                          |



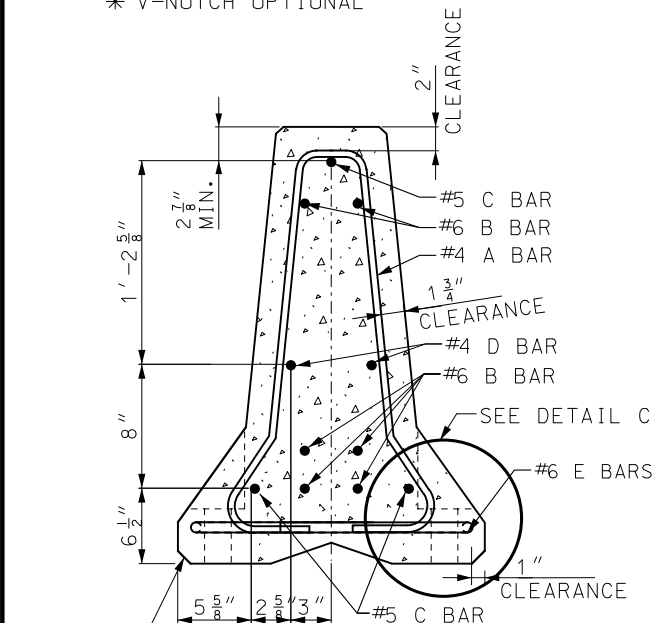
ELEVATION VIEW



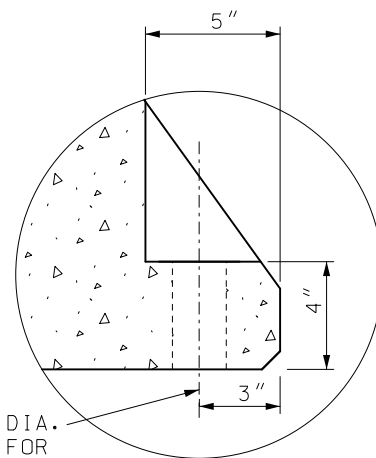
ALTERNATING END VIEWS FOR BARRIER LOOP CONNECTION



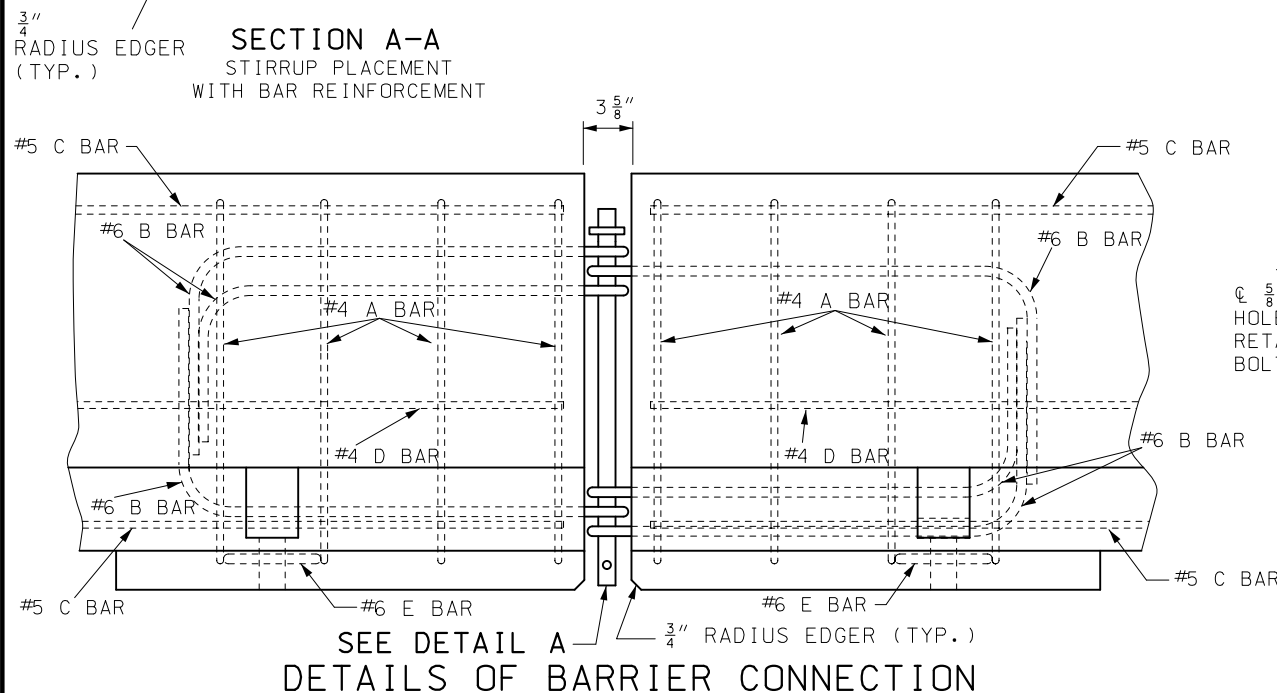
PLAN VIEW



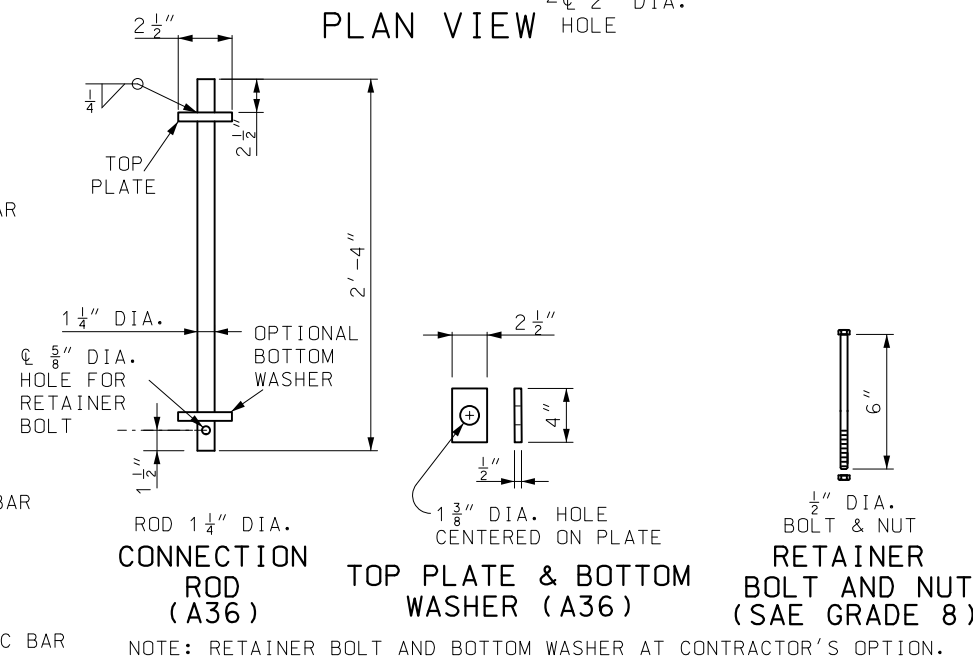
SECTION A-A  
STIRRUP PLACEMENT  
WITH BAR REINFORCEMENT



DETAIL C



SEE DETAIL A  
DETAILS OF BARRIER CONNECTION



DETAIL A  
CONNECTION ROD ASSEMBLY

GENERAL NOTES:

ALL REINFORCING SHALL MEET REQUIREMENTS OF CRSI EXCEPT WHERE SHOWN ON PLANS.

REINFORCING STEEL CLEARANCE TO EDGE OF CONCRETE SHALL BE 1 3/4" UNLESS OTHERWISE SHOWN.

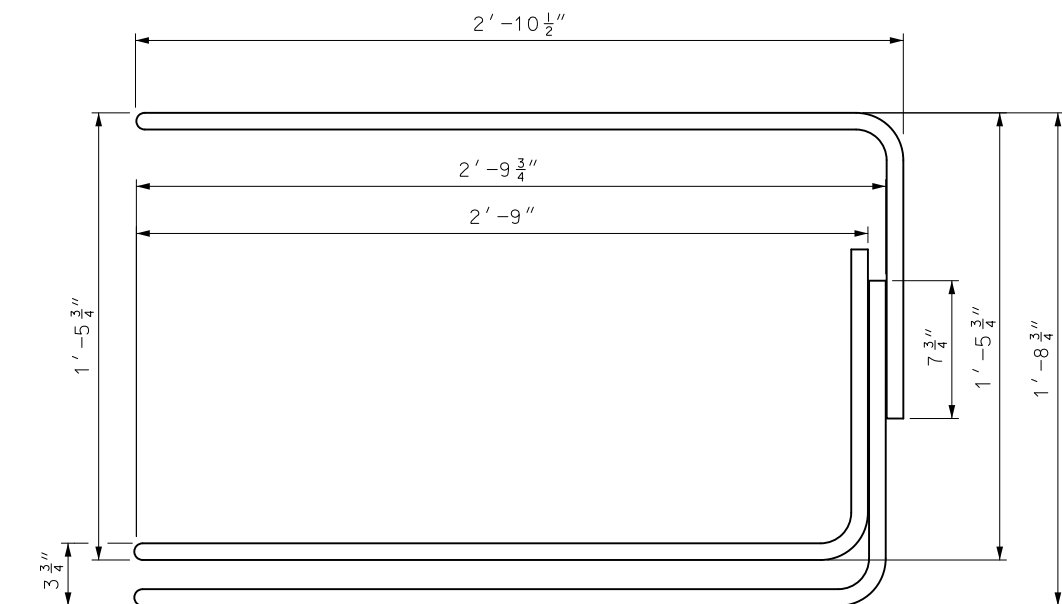
AT NO TIME SHALL THE BARRIERS BE LIFTED OR MOVED BY USE OF THE LOOP BARS.

THE SECTION FURNISHED SHALL COMPLY WITH DIMENSIONS SHOWN, AS APPROVED BY THE ENGINEER.

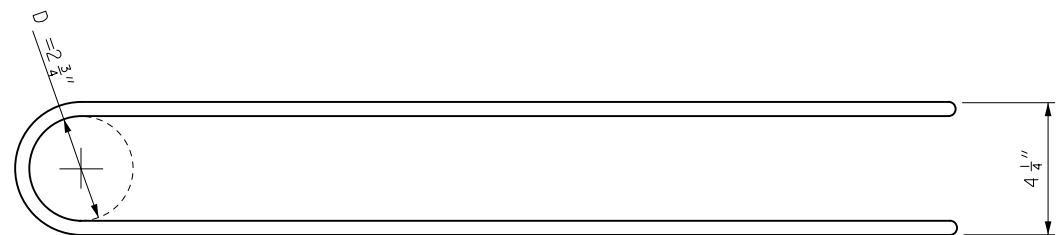
SEE SHEET 3 FOR DELINEATOR DETAILS.

|                                                                                  |  |                                                         |  |
|----------------------------------------------------------------------------------|--|---------------------------------------------------------|--|
|                                                                                  |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>  |  |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  | <b>TEMPORARY CONCRETE TRAFFIC BARRIER TYPE F</b>        |  |
|                                                                                  |  | DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020 |  |
| SHEET NO. 1 OF 8                                                                 |  | <b>617.20F</b>                                          |  |

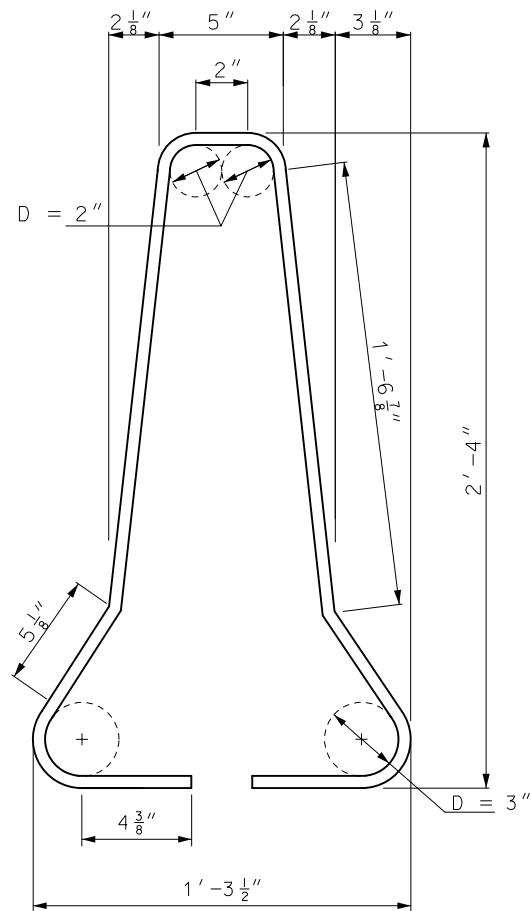




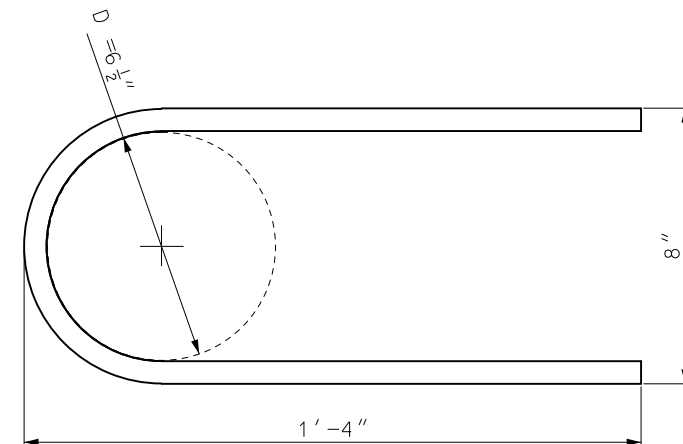
#6 B BAR ELEVATION



#6 B BAR PLAN



#4 A BARS



#6 E BAR

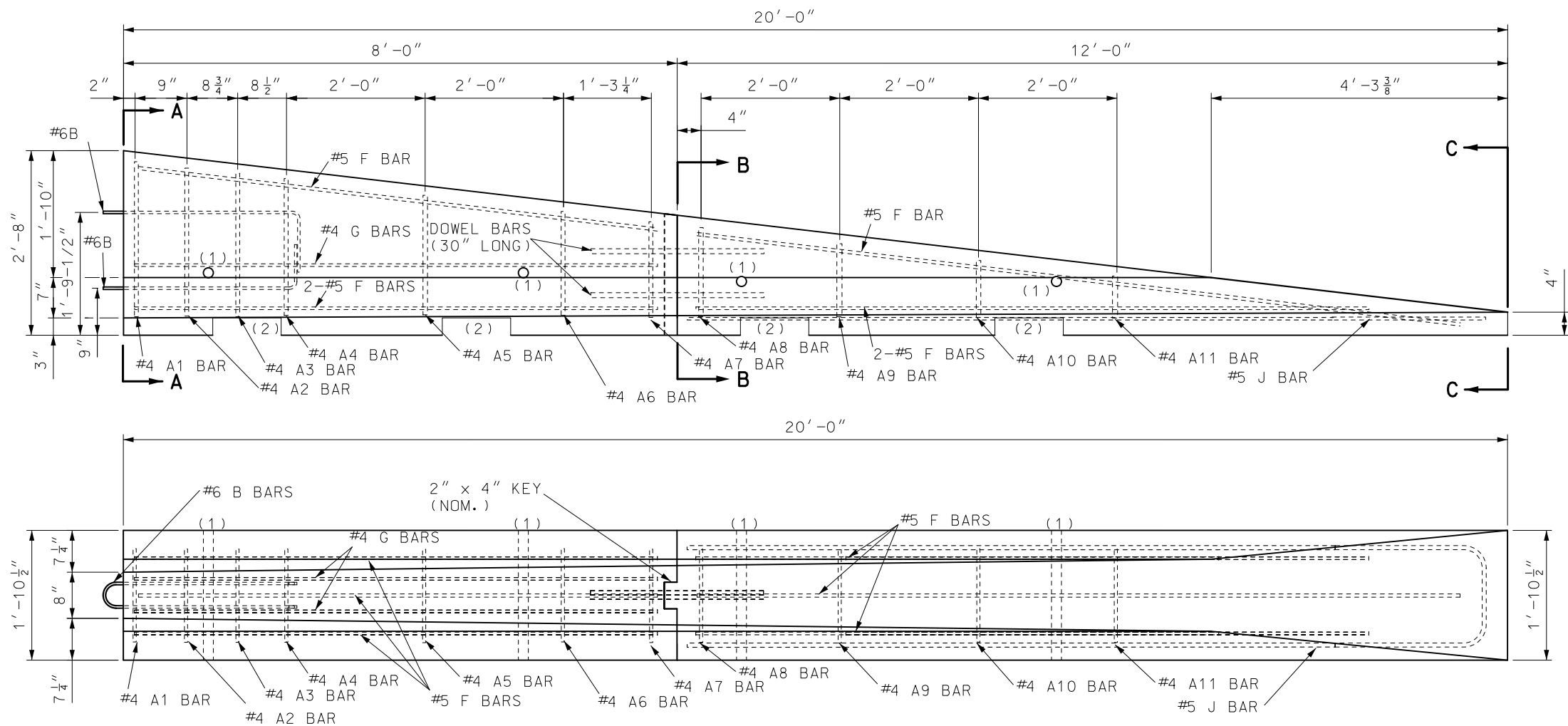
| REINFORCING BARS           |          |             |               |                     |          |
|----------------------------|----------|-------------|---------------|---------------------|----------|
| PER 12'-6" BARRIER SECTION |          |             |               |                     |          |
| MARK                       | BAR SIZE | NO. OF BARS | SHAPE OF EACH | LENGTH EACH (NOM. ) | WEIGHT   |
| A                          | 4        | 14          |               | 6'-5"               | 60.8 lbs |
| C                          | 5        | 3           |               | 12'-2"              | 38.1 lbs |
| D                          | 4        | 2           |               | 12'-2"              | 16.3 lbs |
| E                          | 6        | 6           |               | 2'-11"              | 26.3 lbs |
| LOOP ASSEMBLY              |          |             |               |                     |          |
| B                          | 6        | 6           |               | 7'-10"              | 70.5 lbs |

CONCRETE VOLUME 1.3 CU YDS APPROXIMATE WEIGHT 5601 LBS.

GENERAL NOTE:

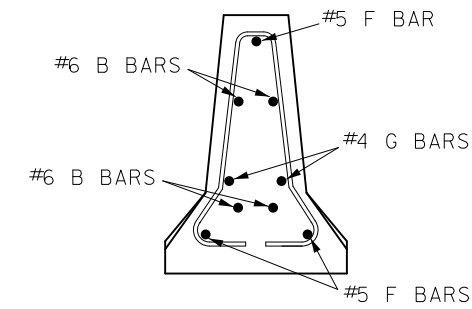
DIMENSIONS ARE OUT TO OUT OF BARS UNLESS OTHERWISE NOTED.

|                                                         |                                                                                                                                            |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|                                                         | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |
|                                                         | <b>TEMPORARY CONCRETE TRAFFIC BARRIER</b><br>TYPE F                                                                                        |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020 | <b>617.20F</b><br>SHEET NO. 2 OF 8                                                                                                         |

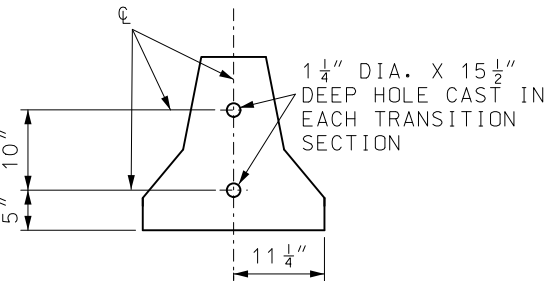


# PRECAST BARRIER HEIGHT TRANSITION (TEMPORARY INSTALLATIONS ONLY)

- (1) OPTIONAL 4 INCH DIAMETER, 11 GAUGE STEEL ROUND MECHANICAL TUBING SLEEVE FOR LIFT HOLE ALLOWED. THE LOCATION OF THE HOLE MAY VARY TO ACCOMMODATE THE DIFFERING WEIGHT DISTRIBUTIONS OF TRANSITION SECTIONS.
- (2) 3" X 1'-0" SLOTS FOR LIFTING - TWO PER SECTION. LOCATION TO BE DETERMINED BY CONTRACTOR.

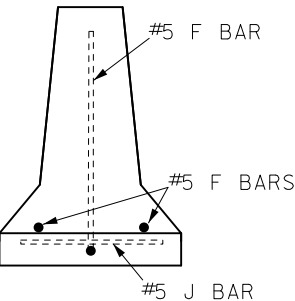


SECTION A-A

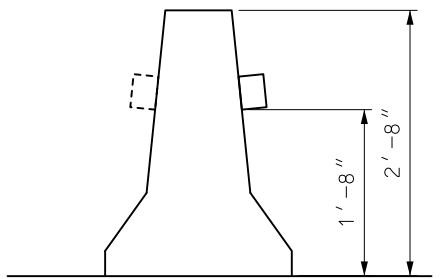


SECTION B-B

NOTE: SECTIONS TO BE CONNECTED WITH TWO- 1" DIA. BARS OR #8 REINFORCING BARS 30" LONG IN 1 1/4" DIA. HOLES AS SHOWN.

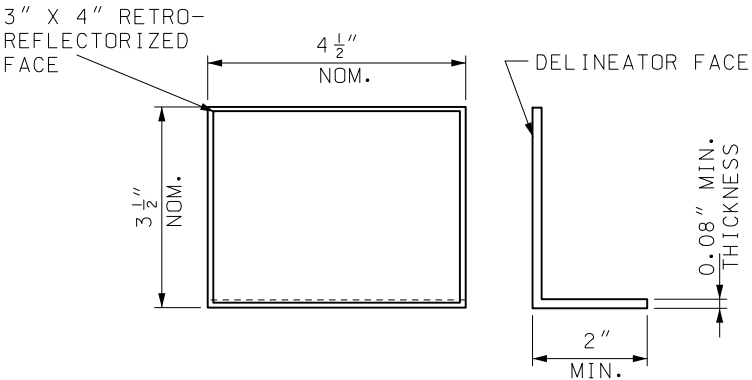


SECTION C-C



## TRAFFIC BARRIER DELINEATORS

REFLECTIVE SHEETING APPLIED TO TRAFFIC BARRIER DELINEATORS SHALL BE IN ACCORDANCE WITH SEC 1042.2.7.5.



DEL INEATOR

### GENERAL NOTES:

REINFORCING STEEL CLEARANCE TO EDGE OF CONCRETE SHALL BE 1 3/4" UNLESS OTHERWISE SHOWN.

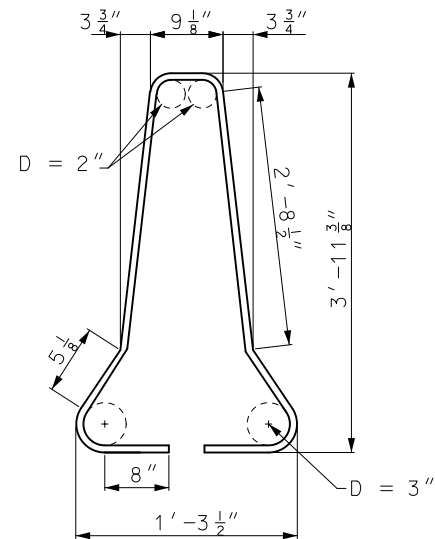
HEIGHT TRANSITIONS SHALL NOT BE USED ON INTERSTATE ROUTES OR IN LOCATIONS WHERE THE POSTED SPEED PRIOR TO CONSTRUCTION IS GREATER THAN 35 MPH.

AT NO TIME SHALL THE BARRIERS BE LIFTED OR MOVED BY USE OF THE LOOP BARS.

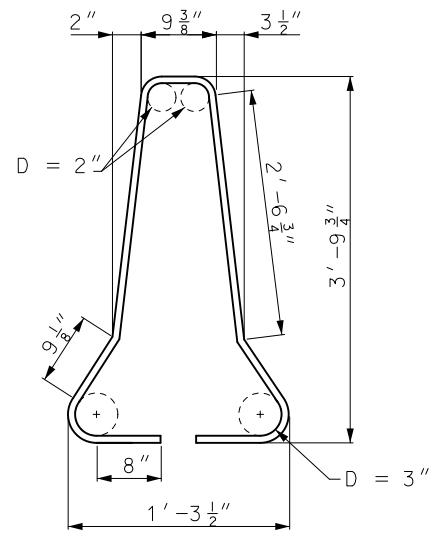
RETAINER BOLT AND NUT MUST BE USED WITH TRANSITION BARRIER.

AT THE OPTION OF THE CONTRACTOR, HEIGHT TRANSITIONS MAY BE MANUFACTURED IN ONE SECTION. THE PLANS FOR REINFORCEMENT ACROSS JOINT SHALL BE APPROVED BY THE ENGINEER PRIOR TO MANUFACTURE.

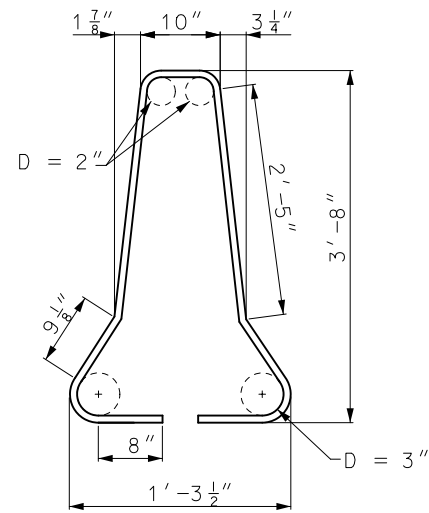
|                                                                                                                                                         |                                                                                          |                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                                          |                       |
| <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                                     | <p><b>TEMPORARY CONCRETE TRAFFIC BARRIER</b></p> <p><b>TYPE F HEIGHT TRANSITIONS</b></p> |                       |
|                                                                                                                                                         | <p>DATE EFFECTIVE: 01/01/2021</p> <p>DATE PREPARED: 10/14/2020</p>                       | <p><b>617.20F</b></p> |



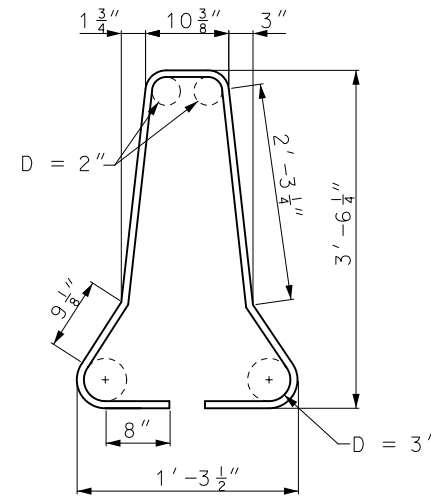
#4 A1 BAR



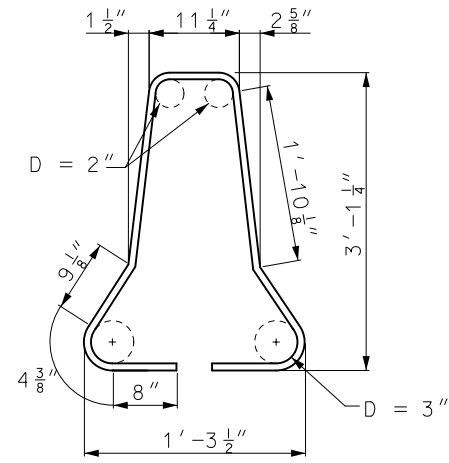
#4 A2 BAR



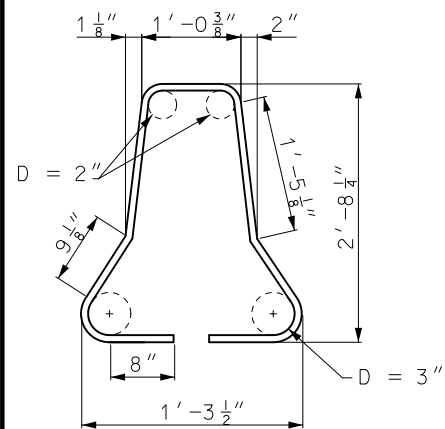
#4 A3 BAR



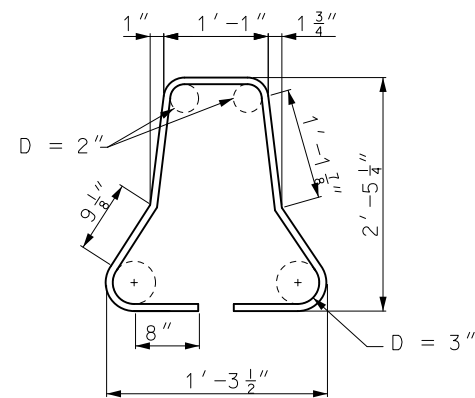
#4 A4 BAR



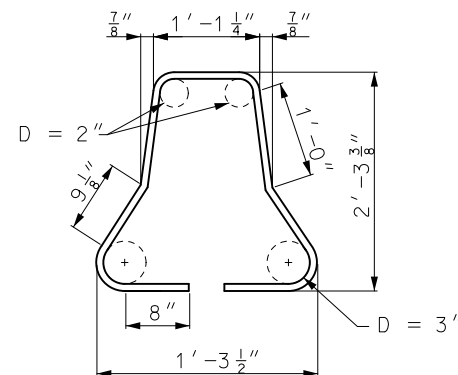
#4 A5 BAR



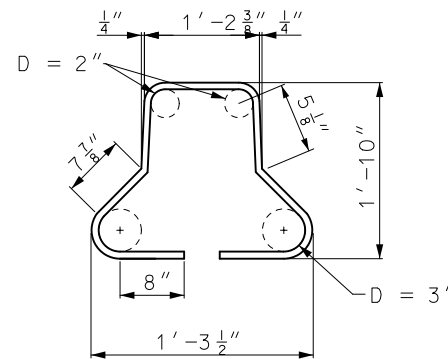
#4 A6 BAR



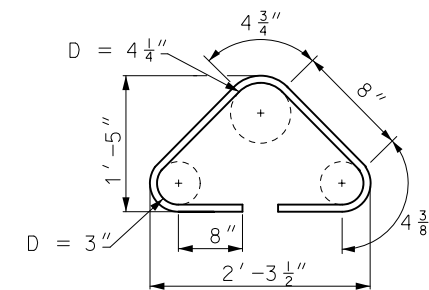
#4 A7 BAR



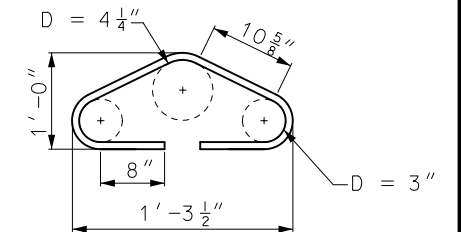
#4 A8 BAR



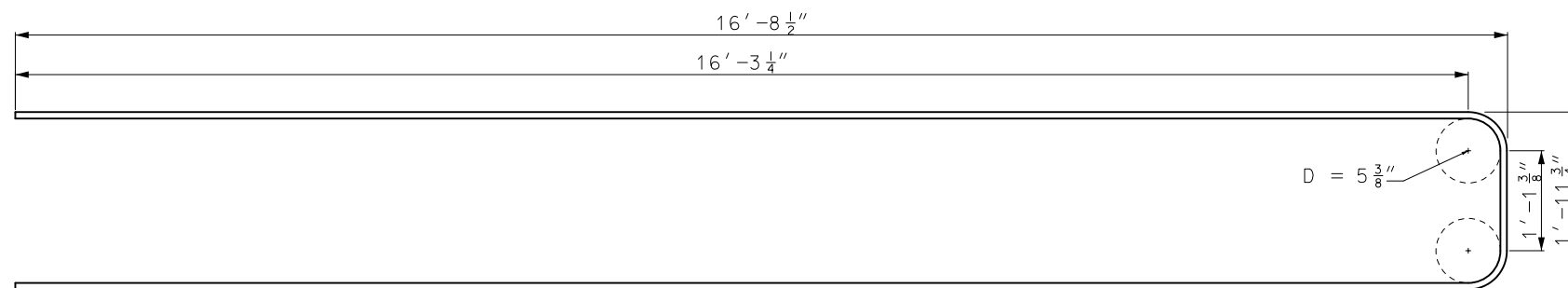
#4 A9 BAR



#4 A10 BAR



#4 A11 BAR



#5 J BAR

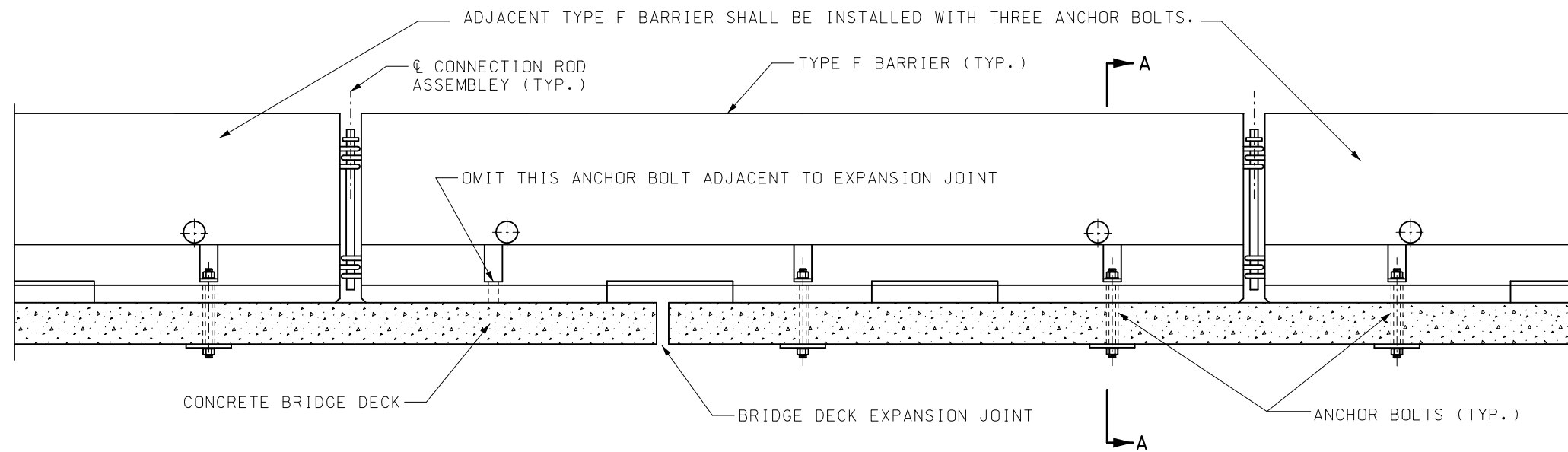
NOTE: FOR DETAILS OF B BARS, SEE SHEET 2 OF 6.

GENERAL NOTES:

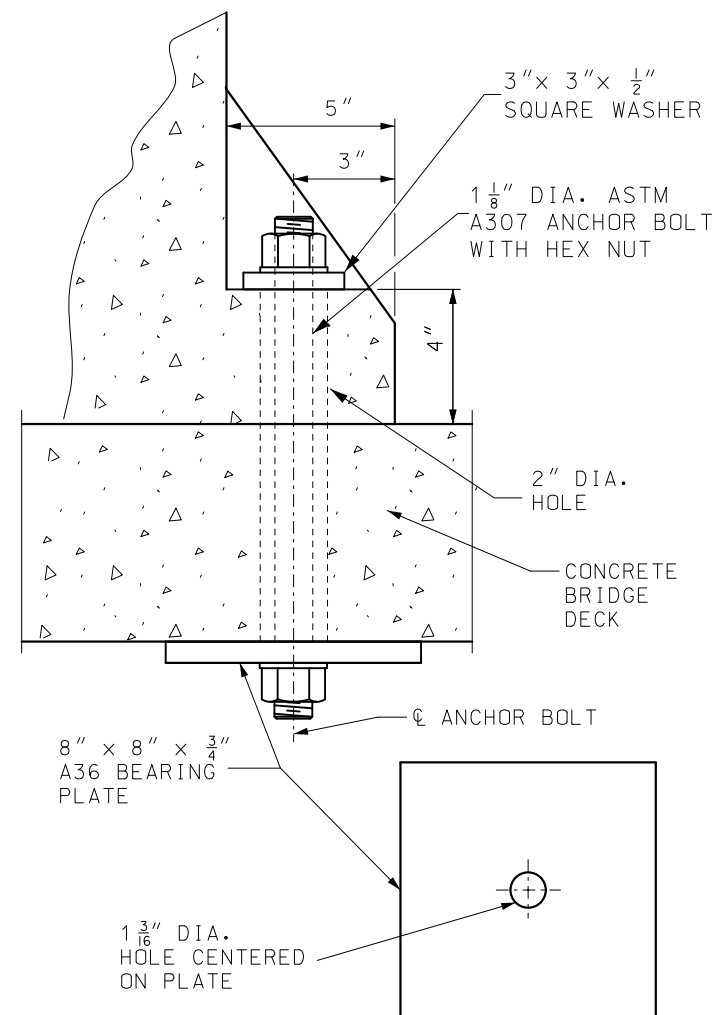
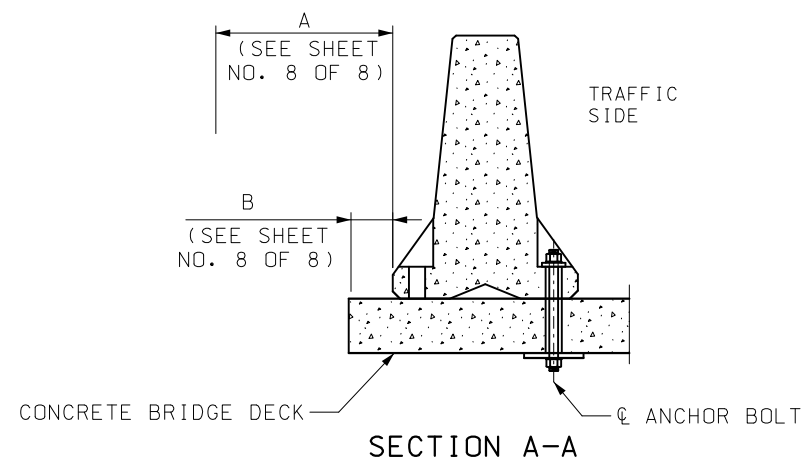
DIMENSIONS ARE OUT TO OUT OF BARS UNLESS OTHERWISE NOTED.

|                                                                                                                                                                                                                                  |                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                        |
|                                                                                                                                             | <b>TEMPORARY CONCRETE TRAFFIC BARRIER</b><br>TYPE F HEIGHT TRANSITIONS |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                          | <b>617.20F</b>                                                         |
| SHEET NO.<br>4 OF 8                                                                                                                                                                                                              |                                                                        |





BOLT THROUGH DECK AT THERMAL EXPANSION JOINTS



BOLT THROUGH DECK DETAIL

GENERAL NOTES:

ANCHOR BOLT SYSTEMS ARE ONLY APPLICABLE ON BRIDGE DECKS AND RIGID PAVEMENTS.

CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD BEFORE ORDERING NEW MATERIAL.

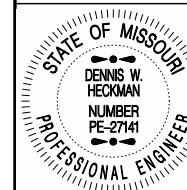
SEE OTHER SHEETS FOR DETAILS NOT SHOWN.

AFTER REMOVAL OF ANCHOR BOLTS HOLES SHALL BE FILLED WITH QUALIFIED SPECIAL MORTAR IN ACCORDANCE WITH SEC 704 OR AN EPOXY BONDING AGENT IN ACCORDANCE WITH SEC 1039.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



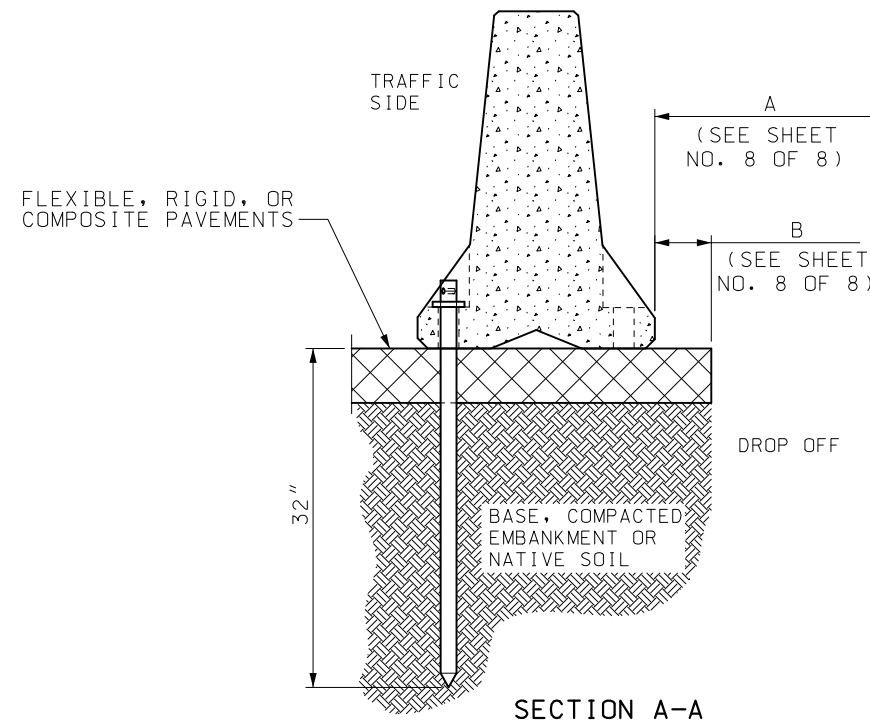
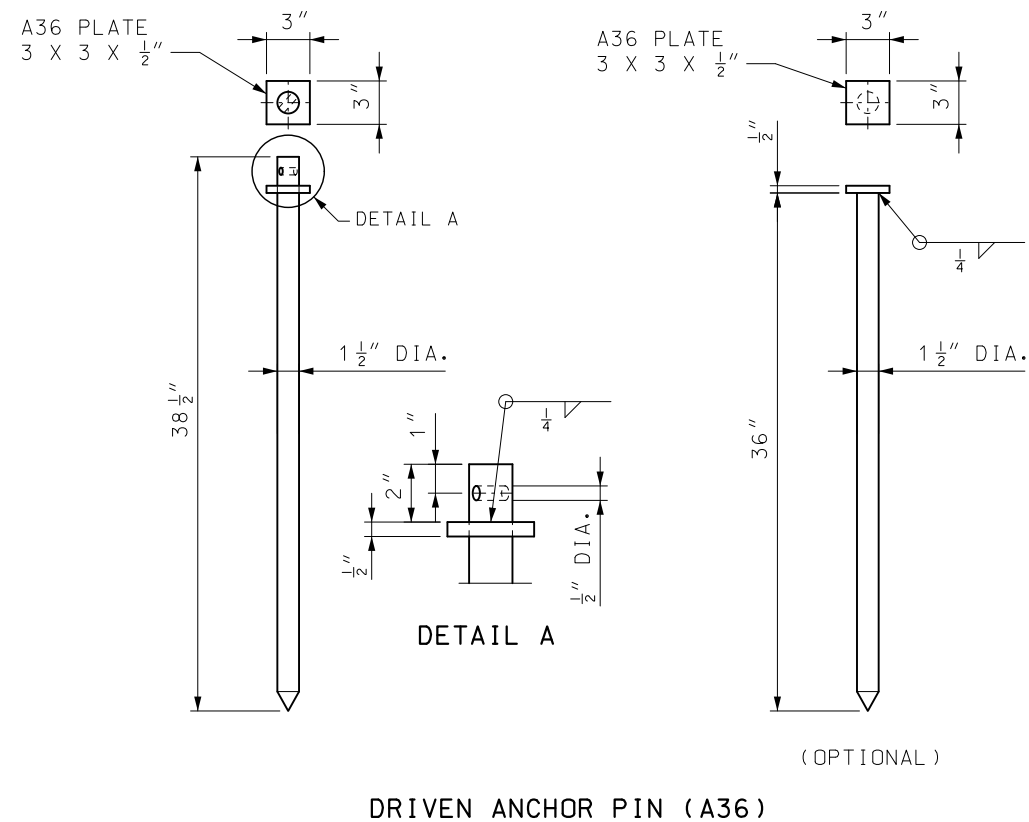
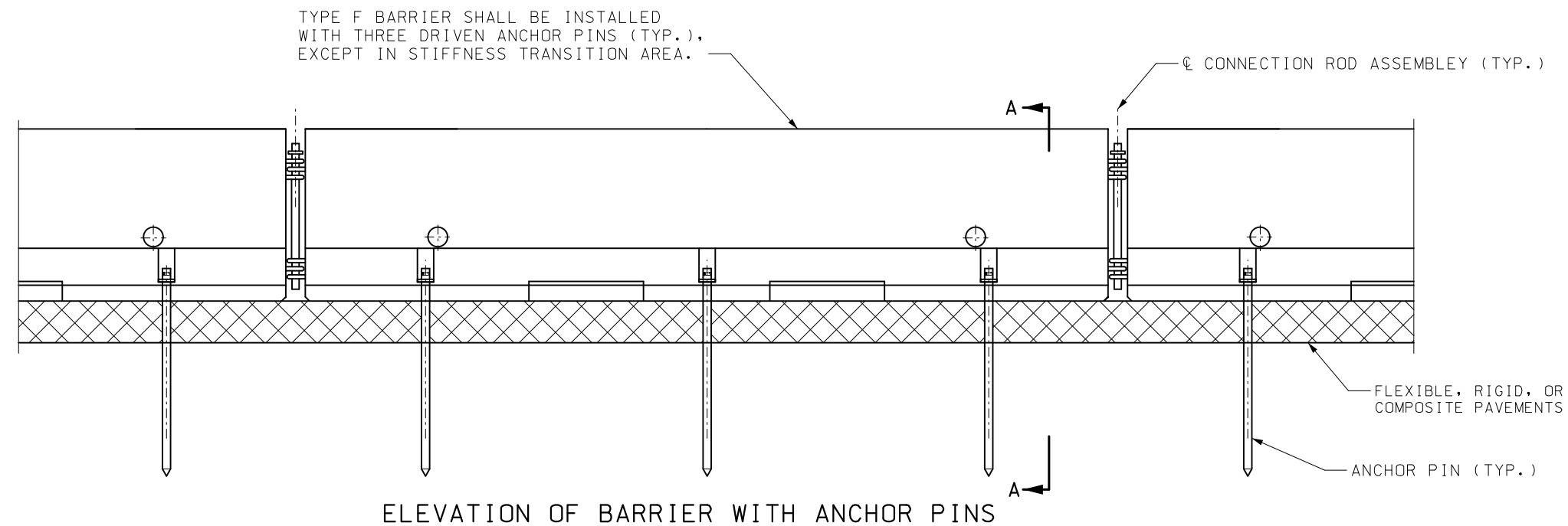
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

TEMPORARY CONCRETE  
TRAFFIC BARRIER  
ANCHORED  
(BOLT SYSTEM)

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

617.20F

SHEET NO.  
6 OF 8



#### GENERAL NOTES:

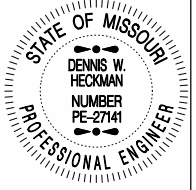
CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD BEFORE ORDERING NEW MATERIAL.

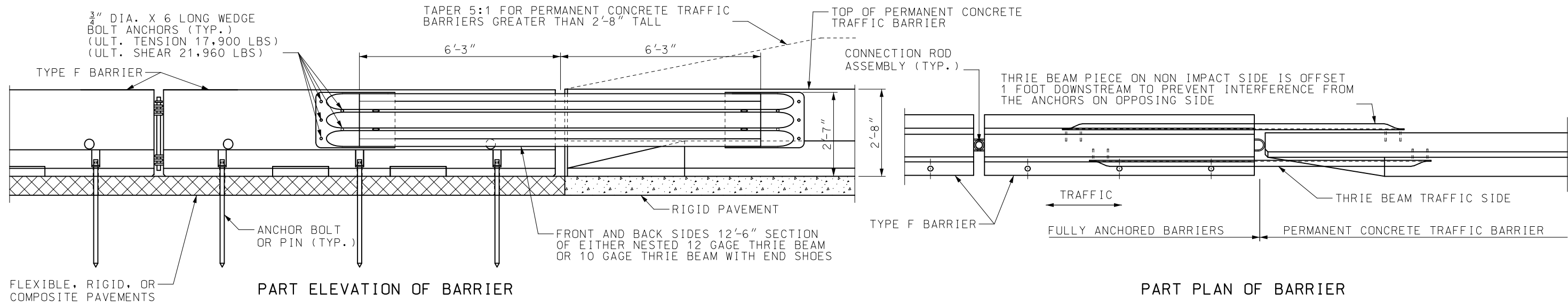
WHERE EXISTING FLEXIBLE PAVEMENT OR RIGID PAVEMENT IS NOT PRESENT A 2" THICK X 30" WIDE MINIMUM ASPHALT PAD SHALL BE CONSTRUCTED.

COST OF FURNISHING AND INSTALLING THE ASPHALT PAD COMPLETE-IN-PLACE WILL BE CONSIDERED INCIDENTAL TO OTHER PAY ITEMS.

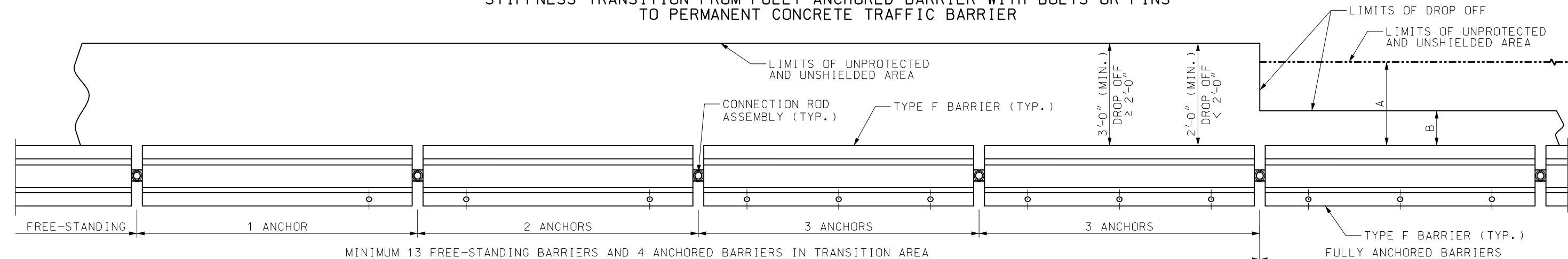
SEE OTHER SHEETS FOR DETAILS NOT SHOWN.

AFTER REMOVAL OF ANCHOR PINS HOLES SHALL BE FILLED WITH QUALIFIED SPECIAL MORTAR IN ACCORDANCE WITH SEC 704.

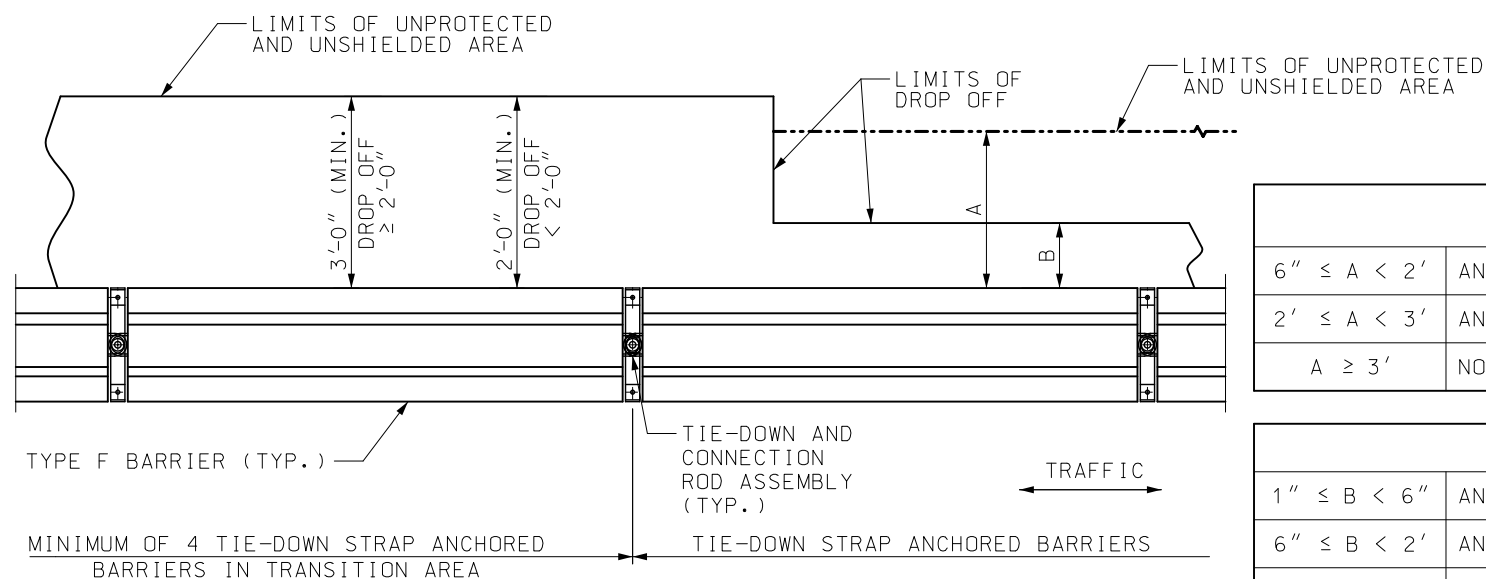
|                                                                                                                                                                                                                                                                                   |                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                  |                                                                               |
|  <p>STATE OF MISSOURI<br/>         DENNIS W. HECKMAN<br/>         NUMBER PE-27141<br/>         PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>TEMPORARY CONCRETE TRAFFIC BARRIER</b></p> <p>ANCHORED (PIN SYSTEM)</p> |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                                                                           | <p><b>617.20F</b></p>                                                         |
| SHEET NO. 7 OF 8                                                                                                                                                                                                                                                                  |                                                                               |



STIFFNESS TRANSITION FROM FULLY ANCHORED BARRIER WITH BOLTS OR PINS TO PERMANENT CONCRETE TRAFFIC BARRIER



PLAN OF STIFFNESS TRANSITION FROM FREE-STANDING BARRIERS TO FULLY ANCHORED BARRIER WITH BOLTS OR PINS



STIFFNESS TRANSITION FOR BARRIER ANCHORED WITH TIE-DOWN STRAPS  
(13 FREE-STANDING BARRIERS NOT REQUIRED)

| LIMITS OF UNPROTECTED AND UNSHIELDED AREA |                                                 |
|-------------------------------------------|-------------------------------------------------|
| $6" \leq A < 2'$                          | ANCHOR EACH BARRIER WITH 3 ANCHOR BOLTS OR PINS |
| $2' \leq A < 3'$                          | ANCHOR WITH BOLTS, PINS, OR TIE-DOWN STRAPS     |
| $A \geq 3'$                               | NO ANCHORAGE REQUIRED UNLESS SHOWN ON PLANS     |

| EDGE OF DROP OFF |                                                 |
|------------------|-------------------------------------------------|
| $1" \leq B < 6"$ | ANCHOR EACH BARRIER WITH 3 ANCHOR BOLTS OR PINS |
| $6" \leq B < 2'$ | ANCHOR WITH BOLTS, PINS, OR TIE-DOWN STRAPS     |
| $B \geq 2'$      | NO ANCHORAGE REQUIRED UNLESS SHOWN ON PLANS     |

NOTE: TEMPORARY CONCRETE TRAFFIC BARRIER MUST MEET BOTH A AND B DIMENSIONS, UNLESS OTHERWISE SHOWN ON PLANS.

GENERAL NOTES:  
CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD BEFORE ORDERING NEW MATERIAL.

COST OF FURNISHING AND INSTALLING THE ANCHOR BOLT SYSTEM, ANCHOR PINS SYSTEM, TIE-DOWN STRAP SYSTEM AND THRIE BEAM COMPLETE-IN-PLACE WILL BE CONSIDERED INCIDENTAL TO OTHER PAY ITEMS.

ALL TYPE F BARRIERS SHALL BE CONNECTED TO ADJACENT TYPE F BARRIERS WITH CONNECTION ROD ASSEMBLY, AND PULLED TIGHT DURING INSTALLATION TO REMOVE SLACK TO PROVIDE LONGITUDINAL TENSION DURING IMPACT.

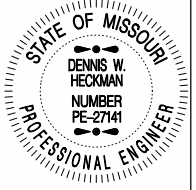
AFTER REMOVAL OF ANCHORS HOLES SHALL BE FILLED WITH QUALIFIED SPECIAL MORTAR IN ACCORDANCE WITH SEC 704.

SEE OTHER SHEETS FOR DETAILS NOT SHOWN.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**TEMPORARY CONCRETE TRAFFIC BARRIER STIFFNESS TRANSITION**

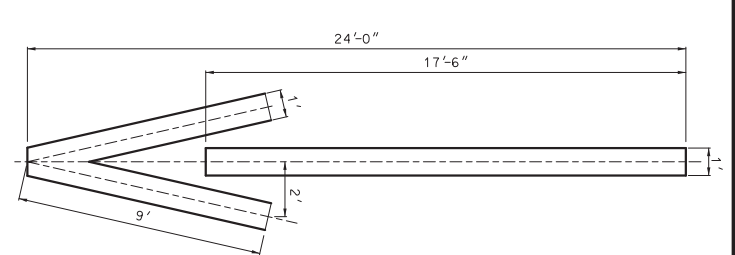
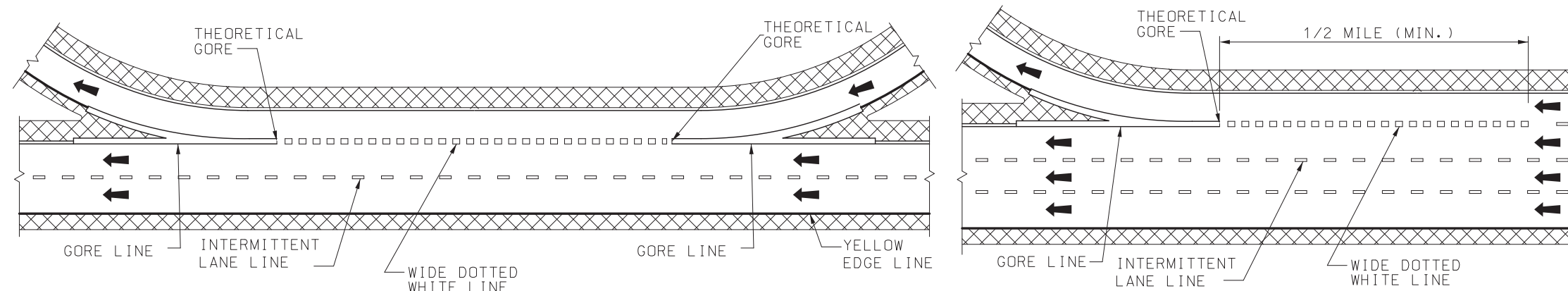
DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

**617.20F**

SHEET NO.  
8 OF 8

| CROSS SECTION                                            |               | CONDITION                                   |                                                                                                                                   | TREATMENT                                | SIGN                             |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|----------------------------------------------------------|---------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                          |               | DIFFERENTIAL                                | TIME                                                                                                                              |                                          | MAINLINE (1)                     | SIDE ROAD (2)     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| EDGE DROP-OFF                                            |               | PAVEMENT EDGE DIFFERENTIAL > 2" TO ≤ 3"     | NON-WORKING HOURS                                                                                                                 | WEDGE SLOPE TO 1V:1H OR FLATTER          | <br>WO8-17 (3)(4)<br>WO8-17p (6) | NO SIGNS REQUIRED | <p>(1) SIGNS SHALL BE SPACED AT APPROXIMATELY ONE-MILE INTERVALS AND LOCATED WITHIN 150 FT. BEYOND ANY STATE ROADS. WHEN A SIGN PLACED AT THE ONE-MILE INTERVAL FALLS WITHIN ½ MILE OF A SIGN PLACED AFTER AN INTERSECTION, THE SIGN PLACED AT THE ONE-MILE INTERVAL MAY BE OMITTED. WHEN SHOULDER DROP-OFF SIGNS WITH UNEVEN LANES ARE BOTH SPECIFIED, ALTERNATING SIGN MESSAGES SHALL BE USED AT ONE-MILE SPACINGS.</p> <p>(2) ON SIDE ROADS WITH POSTED SPEED OF 45 MPH OR GREATER, SIGNS SHALL BE PLACED 150 FT. IN ADVANCE OF INTERSECTION WITH MAINLINE.</p> <p>(3) SIGNS SHALL BE LOCATED ON THE SIDE OF THE ROADWAY WHERE THE PAVEMENT EDGE DIFFERENTIAL EXISTS.</p> <p>(4) SIGNS TO REMAIN VISIBLE UNTIL SHOULDER SHAPING IS COMPLETE.</p> <p>(5) SIGNS SHALL BE LOCATED ON RIGHT SIDE OF NON-DIVIDED HIGHWAYS AND ON BOTH SIDES OF DIVIDED HIGHWAYS WHERE A LANE LINE DIFFERENTIAL EXISTS.</p> <p>(6) WHEN THE SHOULDER DROP-OFF SIGNS ARE IN PLACE FOR GREATER THAN THREE DAYS, THE SHOULDER DROP-OFF PLAQUE SHOULD BE USED IN ADDITION WITH THE SHOULDER DROP-OFF SIGN.</p> |  |
|                                                          | WORKING HOURS |                                             | NO EDGE TREATMENT REQUIRED                                                                                                        |                                          |                                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|                                                          |               | PAVEMENT EDGE DIFFERENTIAL > 3"             | NON-WORKING HOURS                                                                                                                 | WEDGE SLOPE TO 1V:3H OR FLATTER          | <br>WO8-17 (3)(4)<br>WO8-17p (6) | <br>WO8-1 (3)     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|                                                          | WORKING HOURS |                                             | DELINEATE DIFFERENTIAL WITH CHANNELIZERS                                                                                          |                                          |                                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|                                                          |               | ANY PAVEMENT EDGE OR LANE LINE DIFFERENTIAL | NON-WORKING AND WORKING HOURS WHERE PLANS REQUIRE ADJACENT LANE CLOSURE WITH CHANNELIZATION OR PARTIAL LANE CLOSURE WITH BARRIER. | NO EDGE TREATMENT REQUIRED               | NO SIGNS REQUIRED                | NO SIGNS REQUIRED |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|                                                          |               |                                             |                                                                                                                                   |                                          |                                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|                                                          |               |                                             |                                                                                                                                   |                                          |                                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| * FOR DISTANCES LESS THAN 2', SEE STANDARD PLAN 617.20.  |               |                                             |                                                                                                                                   |                                          |                                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| ** FOR DISTANCES LESS THAN 3', SEE STANDARD PLAN 617.20. |               |                                             |                                                                                                                                   |                                          |                                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| LANE DIFFERENTIAL                                        |               | LANE LINE DIFFERENTIAL ≤ 2"                 | NON-WORKING AND WORKING HOURS                                                                                                     | NO EDGE TREATMENT REQUIRED               | <br>WO8-11 (5)                   | NO SIGNS REQUIRED | <p>GENERAL NOTES:</p> <p>SIGNS SHALL BE VISIBLE TO TRAFFIC ONLY WHEN AND WHERE CONDITIONS EXIST.</p> <p>FOR ADDITIONAL SIGN SPACING AND DETAILS, SEE STANDARD PLAN 620.10.</p> <div><div><p>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</p><p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p></div><div><p><b>PAVEMENT EDGE TREATMENT</b></p></div><div><div>DATE EFFECTIVE: 1/1/2026</div><div>DATE PREPARED: 9/29/2025</div></div><div>619.10K</div><div>SHEET NO.<br/>1 OF 1</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
|                                                          |               | LANE LINE DIFFERENTIAL > 2"                 | NON-WORKING AND WORKING HOURS WHERE LANES OPEN TO TRAFFIC                                                                         | WEDGE SLOPE TO 1V:3H OR FLATTER          | <br>WO8-11 (5)                   | <br>WO8-1         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|                                                          |               |                                             | NON-WORKING AND WORKING HOURS WHERE LANE CLOSED TO TRAFFIC                                                                        | DELINEATE DIFFERENTIAL WITH CHANNELIZERS |                                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |





FIRST ARROW 25' FROM CROSSROAD OR STOP LINE.  
 MAXIMUM 3 ARROWS AT 100' INTERVALS.  
 ON MULTI-LANE RAMP USE ARROW IN EACH LANE.  
 WRONG WAY ARROWS ARE NOT USED WHEN RAMP HAS LANE USE CONTROL ARROWS.

### OFF RAMP WRONG WAY ARROW

GENERAL NOTES:  
 DOTTED LINES SHALL BE 3 FEET IN LENGTH SEPARATED BY 9 FOOT GAPS.  
 REFER TO THE STANDARD PLAN 626.00 WHEN INSTALLING PAVEMENT MARKINGS OVER RUMBLE STRIPS.  
 WIDE LINES ARE TWICE THE WIDTH OF NORMAL LINES.  
 LANE LINES SHALL BE AN INTERMITTENT OR SOLID WHITE.  
 INTERMITTENT LINES SHALL BE 10 FEET IN LENGTH SEPARATED BY 30 FOOT GAPS.

EDGE LINES SHALL BE CONTINUOUS SOLID WHITE OR YELLOW LINES. RIGHT SIDE EDGE LINES SHALL BE SOLID WHITE. MEDIAN OR LEFT SIDE EDGE LINES ON DIVIDED HIGHWAYS AND ON THE LEFT SIDE OF RAMPS SHALL BE SOLID YELLOW. EDGE LINES SHALL BE CONTINUOUS ACROSS DRIVEWAYS AND MINOR INTERSECTING ROADS.

"NO PASSING" LINES SHALL BE CONTINUOUS SOLID YELLOW.  
 "NO PASSING" LINES SHALL BE PLACED AS SHOWN IN "LINE DETAIL". "NO PASSING" LINES ON A TWO-LANE, TWO-WAY HIGHWAY WHEN PASSING IS PROHIBITED IN EACH DIRECTION SHALL BE PLACED 4 INCHES APART AND THE INTERMITTENT CENTERLINE SHALL BE OMITTED.

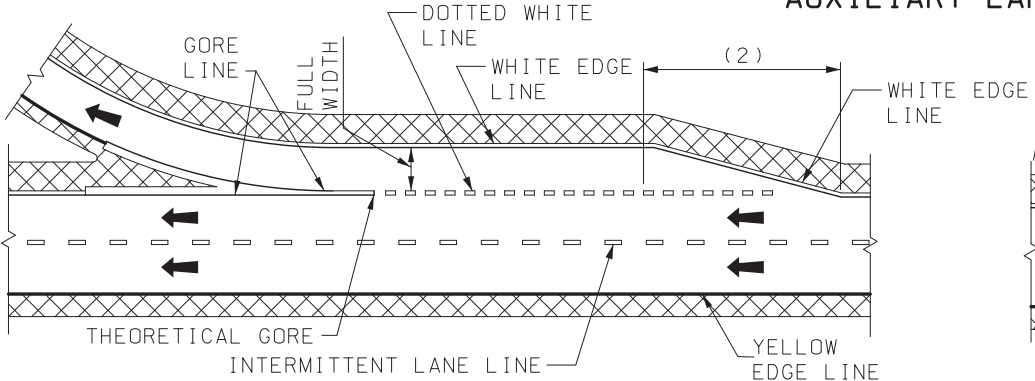
STOP LINES SHALL BE A SOLID WHITE TRANSVERSE LINE 24 INCHES WIDE, LOCATED AT LEAST 4 FEET FROM THE NEAREST EDGE OF THE INTERSECTING ROADWAY.

CROSSWALK LINES SHALL BE SOLID WHITE TRANSVERSE LINES 6 INCHES WIDE AT LEAST 6 FEET APART. CROSSWALK LINES ON THE INTERSECTION SIDE OF THE CROSSWALK SHALL MEET AT THE CURB.

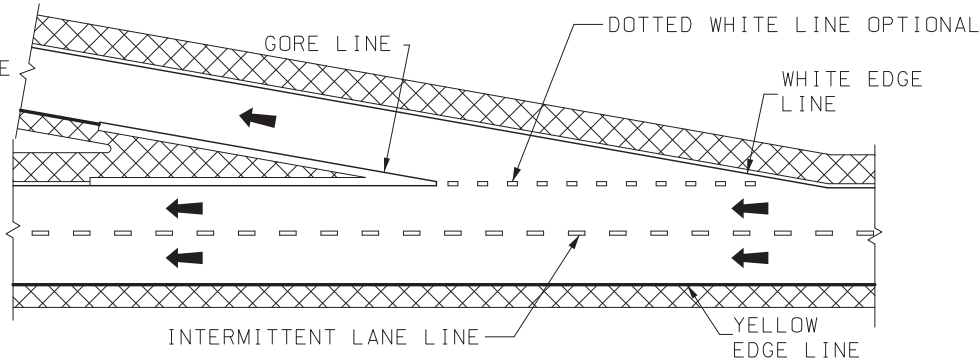
GORE LINES SHALL BE A SOLID WHITE LINE WITH A WIDTH TWICE THAT OF THE EDGE LINE.

ARROWS AND WORD SYMBOLS SHALL BE SOLID WHITE.

### AUXILIARY LANE MARKING

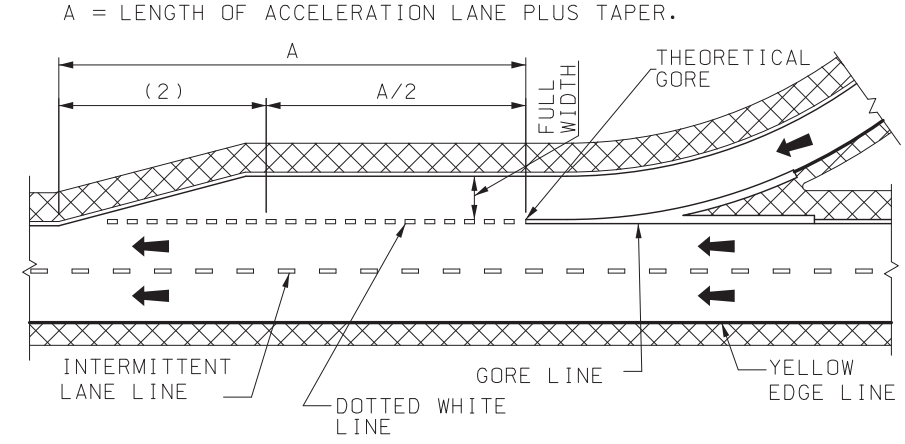


PARALLEL LANE

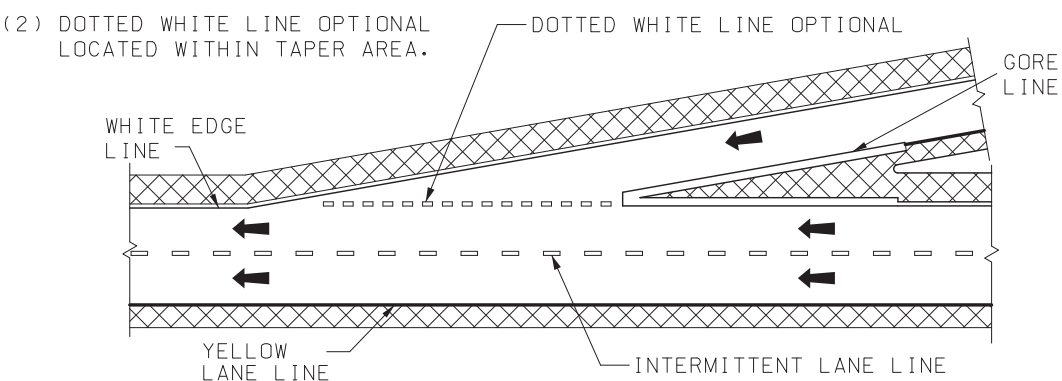


TAPERED LANE

### EXIT RAMP MARKING

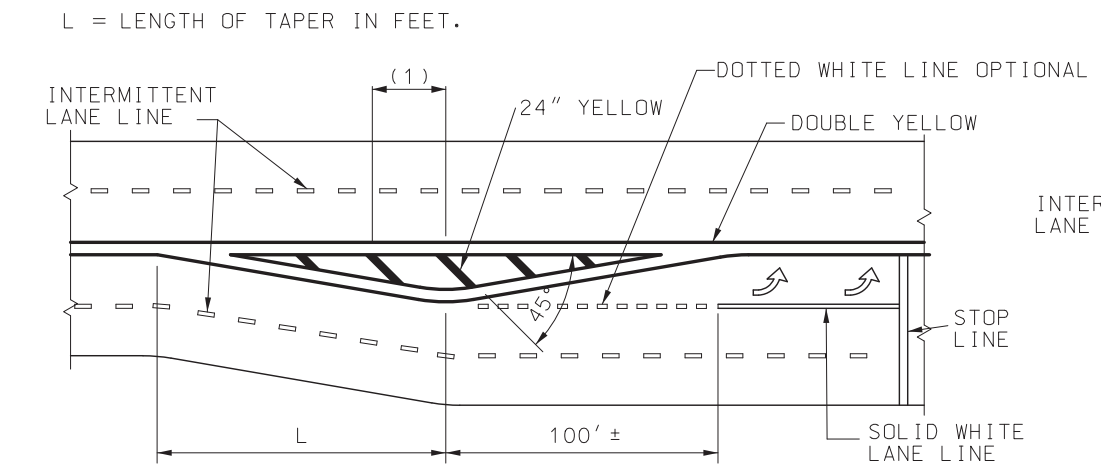


PARALLEL LANE

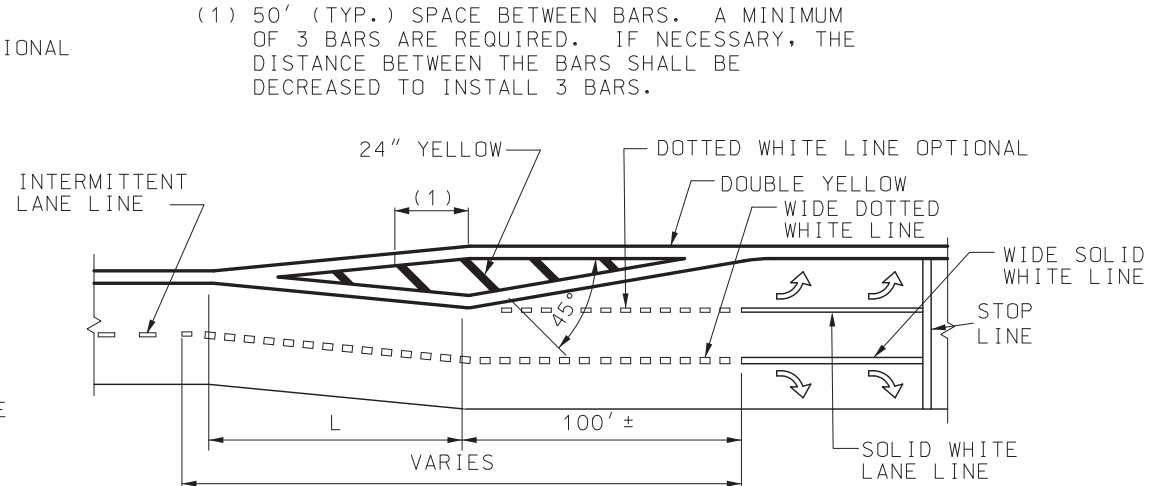


TAPERED LANE

### ENTRANCE RAMP MARKING



MEDIAN ISLAND MARKING

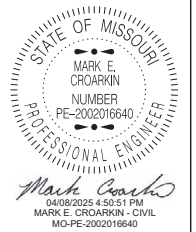


LANE DROP MARKING

### MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



105 WEST CAPITOL  
 JEFFERSON CITY, MO 65102  
 1-888-ASK-MODOT (1-888-275-6636)

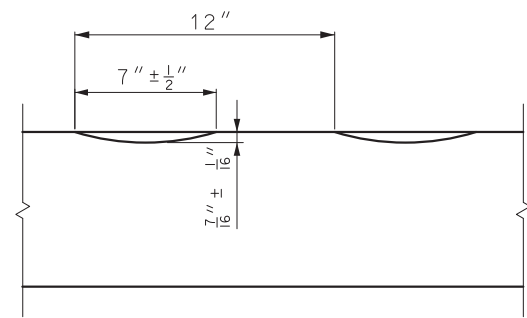
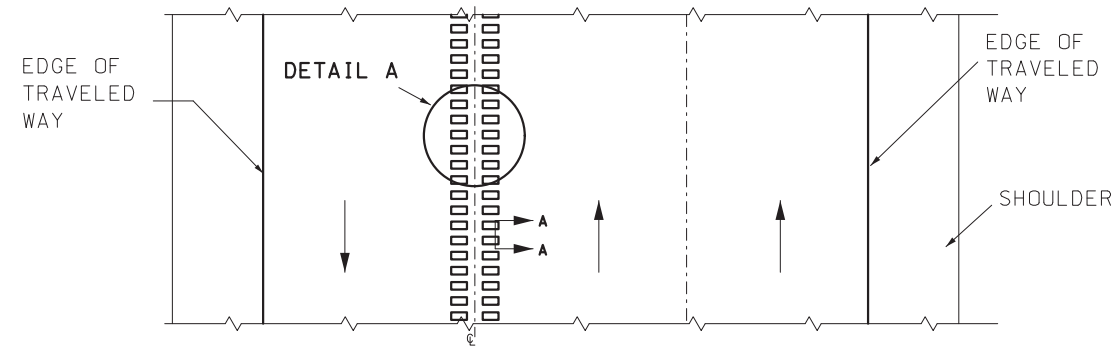
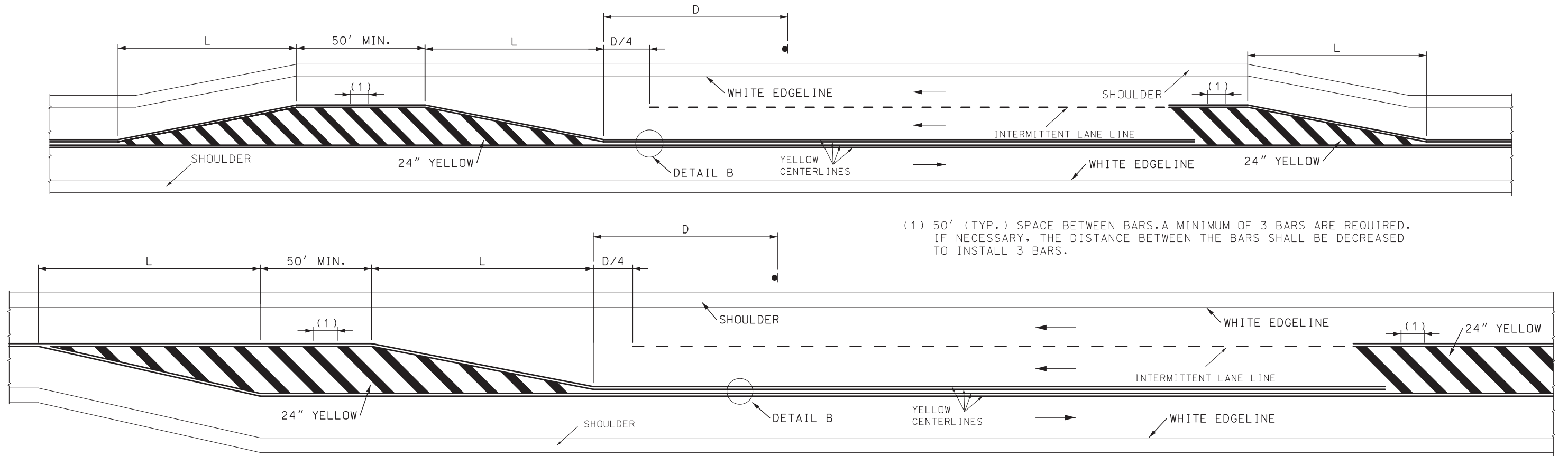


### PAVEMENT MARKING

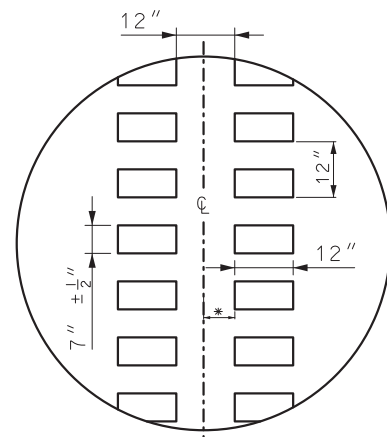
DATE EFFECTIVE: 7/1/2025  
 DATE PREPARED: 3/13/2025

620.00P

SHEET NO.  
 1 OF 6

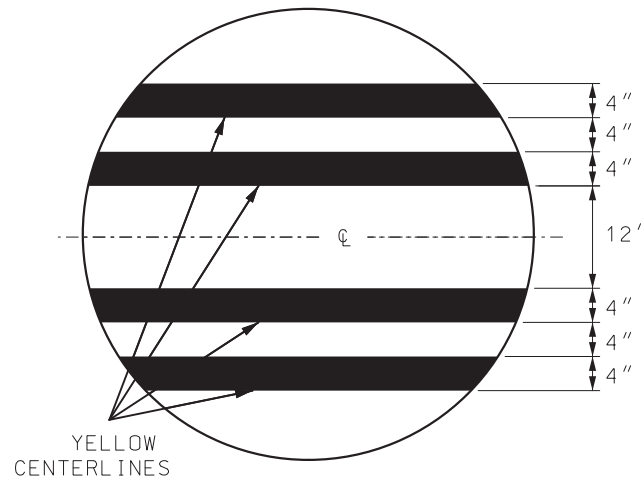


SECTION A-A



DETAIL A

\* = LATERAL DEVIATION SHALL NOT EXCEED ONE INCH IN 100 FEET.



DETAIL B

$L = S \times W$  WHEN POSTED SPEED 45 MPH OR GREATER OR  $WS^2 / 60$  WHEN POSTED SPEED IS 40 MPH OR LESS.  
 EXTEND DISTANCE (L) AS REQUIRED BY SIGHT DISTANCE CONDITIONS.  
 $L$  = LENGTH OF TAPER IN FEET.  
 $S$  = POSTED OR 85 PERCENTILE SPEED IN MPH.  
 $W$  = OFFSET DISTANCE IN FEET.  
 $D$  = WARNING SIGN SPACING MEASURED FROM BEGINNING OF THE TAPER TO WARNING SIGN "LANE ENDS MERGE RIGHT"

#### GENERAL NOTES:

INTERMITTENT LINES SHALL BE 10 FEET IN LENGTH SEPARATED BY 30 FOOT GAPS.

RIGHT SIDE EDGELINES SHALL BE SOLID WHITE. EDGELINES SHALL BE CONTINUOUS ACROSS DRIVEWAYS AND MINOR INTERSECTING ROADS.

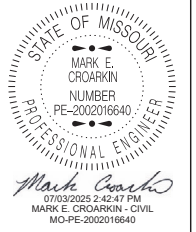
CENTERLINE RUMBLE STRIPS ON PASSING ROADWAYS SHALL FOLLOW PAVEMENT STRIPING THROUGH TRANSITIONS. SEE CONTRACT PLANS FOR STRIPING DETAILS.

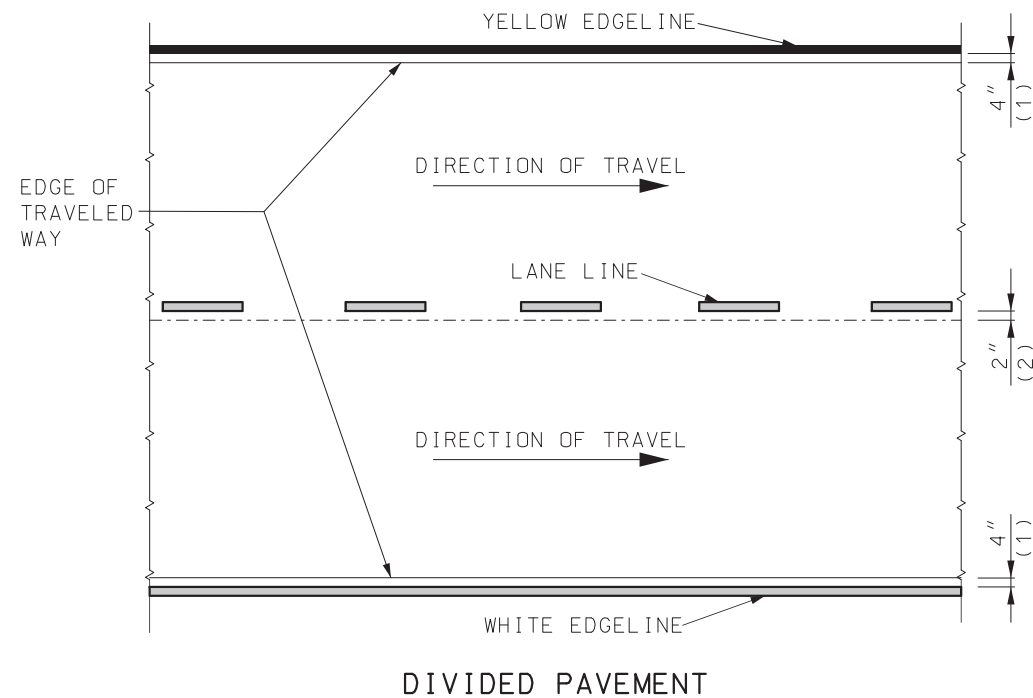
RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGES.

ALL RUMBLE STRIPS SHALL BE MILLED.

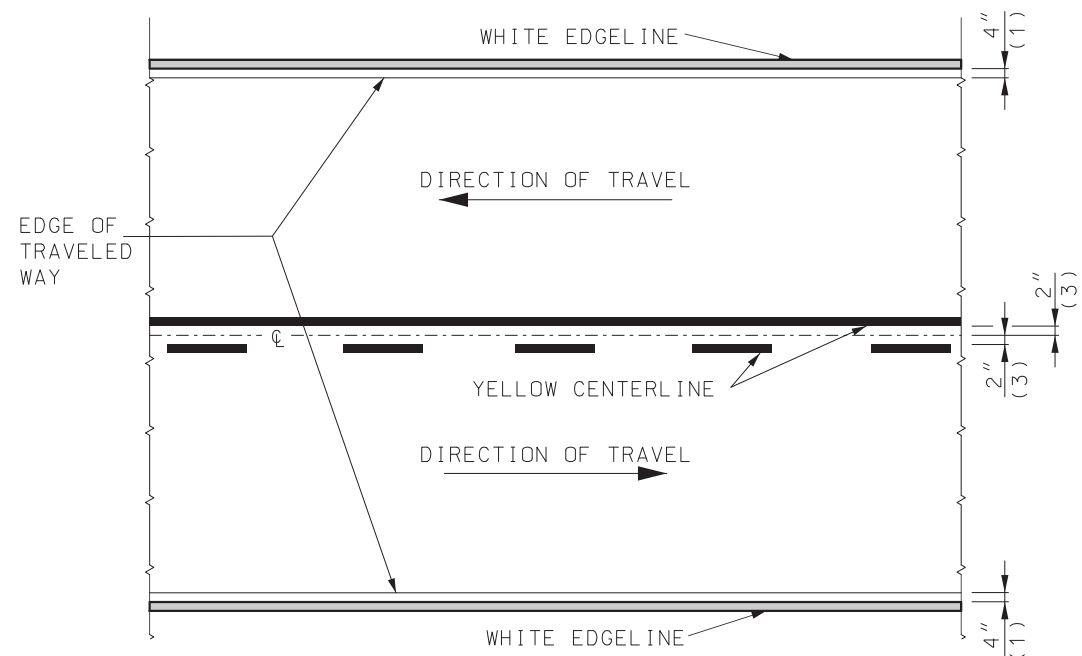
CENTERLINE RUMBLE STRIPS SHALL BE CONTINUOUS THROUGH CONNECTIONS OF SIDEROADS WITH NO LEFT TURN LANES.

DISCONTINUE CENTERLINE RUMBLE STRIPS THROUGH THE LIMITS OF ALL LEFT TURN LANES. INCLUDING ANY LANE TAPER SECTIONS.

|                                                                                                                                                                                                                                  |                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                              |
|                                                                                                                                             | <b>PAVEMENT MARKING</b><br><br><b>ALTERNATE PASSING LANE</b> |
| DATE EFFECTIVE: 10/1/2025<br>DATE PREPARED: 7/2/2025                                                                                                                                                                             | <b>620.00P</b>                                               |
| SHEET NO. 2 OF 6                                                                                                                                                                                                                 |                                                              |

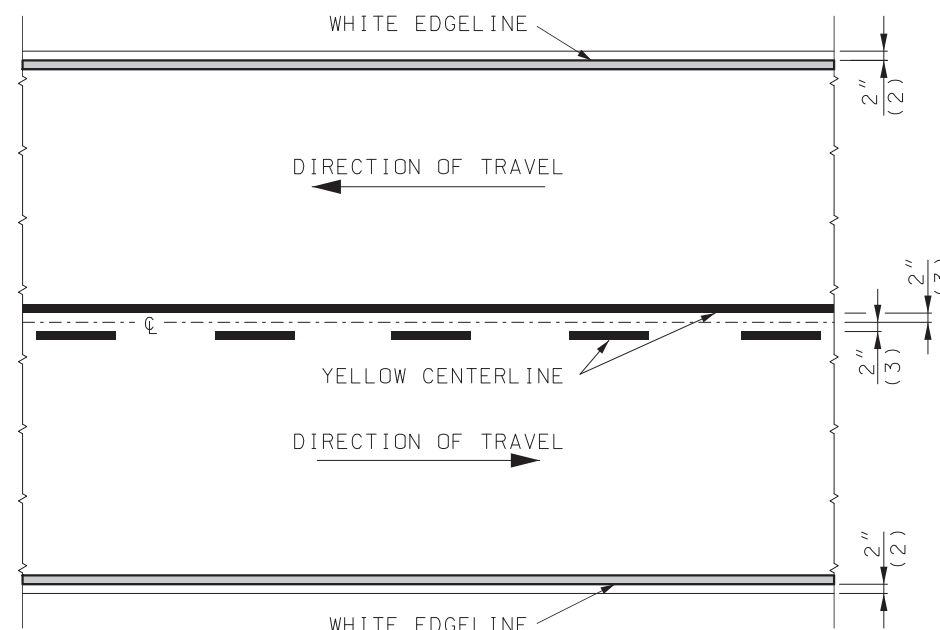


DIVIDED PAVEMENT



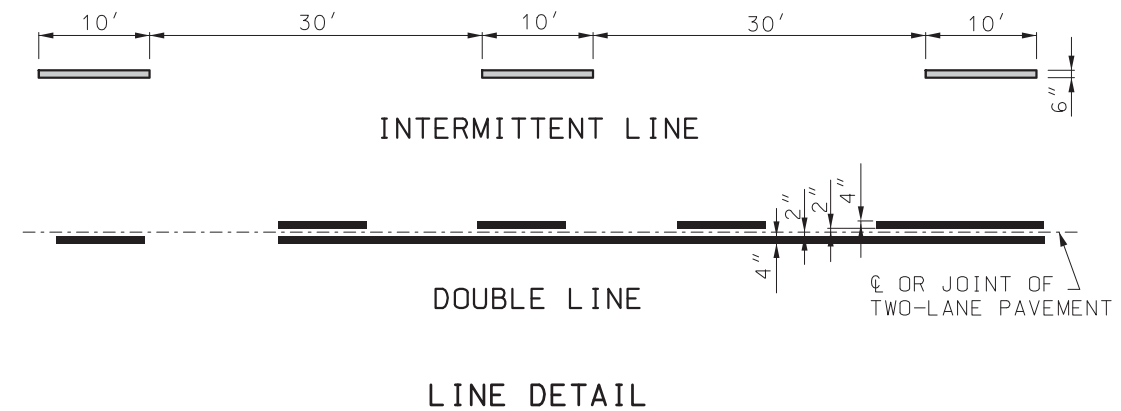
TWO-LANE TWO-WAY

TYPICAL STRIPING OFFSETS  
FOR RUMBLE STRIPES



TWO-LANE TWO-WAY

TYPICAL STRIPING OFFSETS  
WITHOUT RUMBLE STRIPES

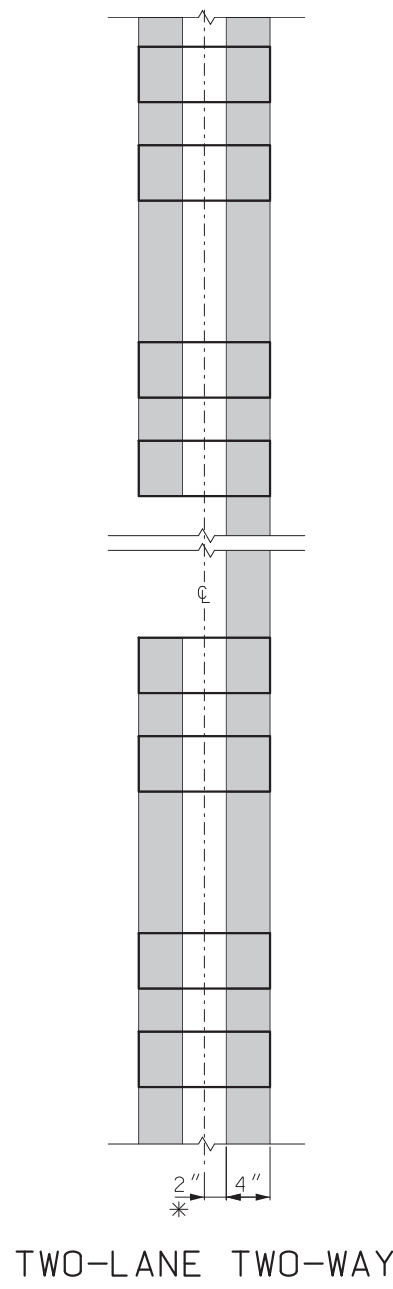
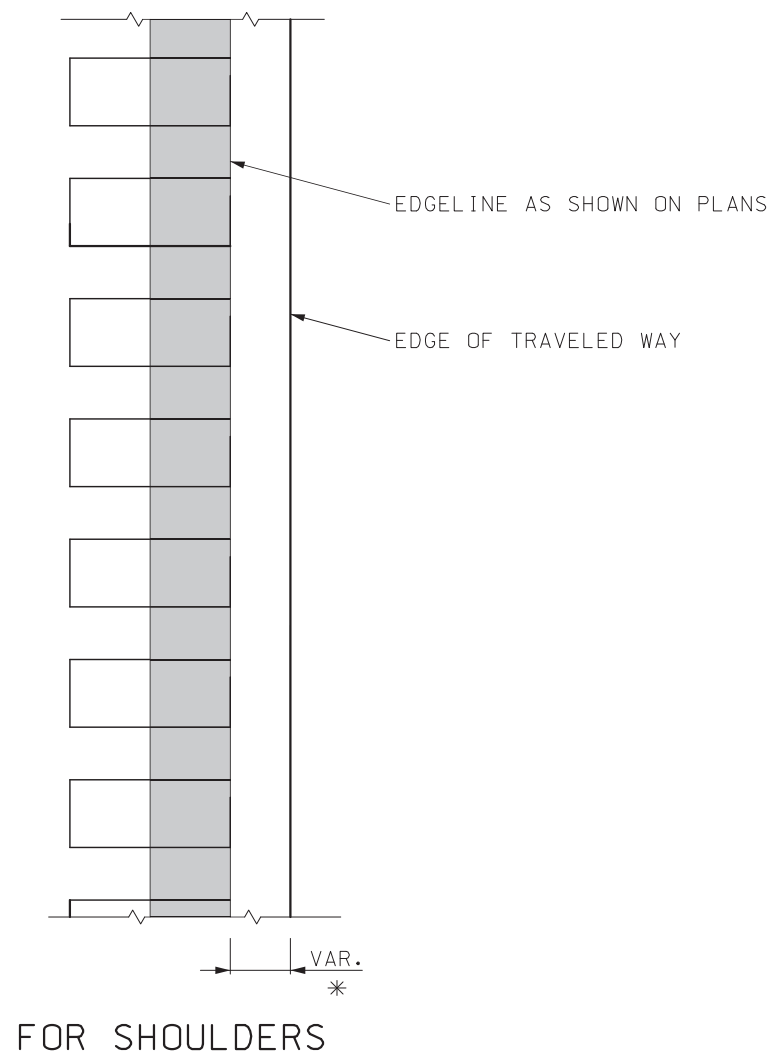


LINE DETAIL



- (1) OFFSET FROM EDGE OF TRAVELED WAY  
(2) OFFSET FROM JOINT  
(3) OFFSET FROM CENTERLINE

|                                                                                                                                                                                 |                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                         |                                |
| <p>MARK E. CROARKIN<br/>NUMBER<br/>PE-2002016640<br/>PROFESSIONAL ENGINEER</p> <p>Mark Croarkin<br/>04/08/2025 4:52:05 PM<br/>MARK E. CROARKIN - CIVIL<br/>MO-PE-2002016640</p> | <p><b>PAVEMENT MARKING</b></p> |
| <p>DATE EFFECTIVE: 7/1/2025<br/>DATE PREPARED: 3/13/2025</p>                                                                                                                    | <p>620.00P</p>                 |
| <p>SHEET NO.<br/>3 OF 6</p>                                                                                                                                                     |                                |

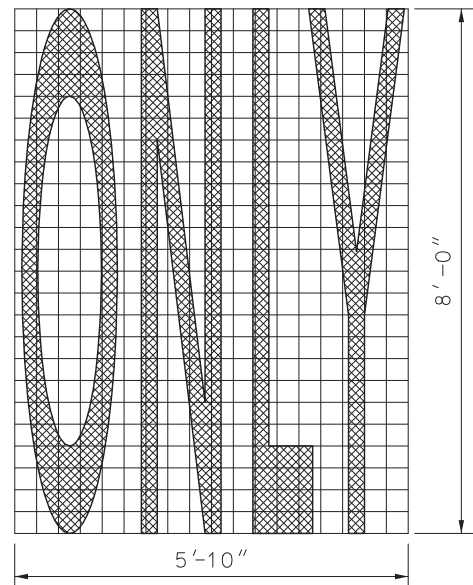


GENERAL NOTES:  
SEE STANDARD PLAN 626.00 FOR RUMBLE STRIPS.

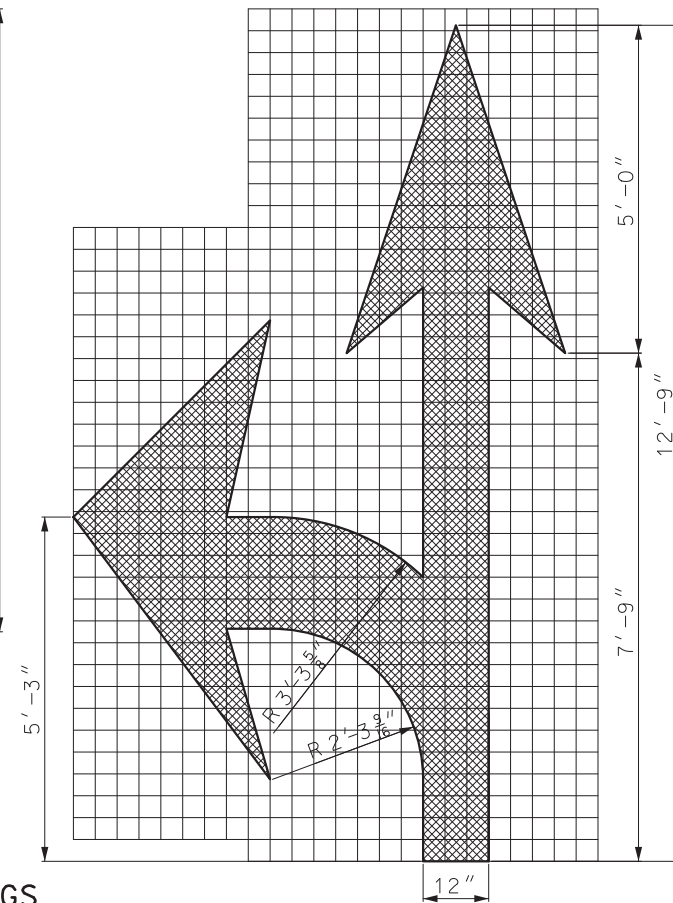
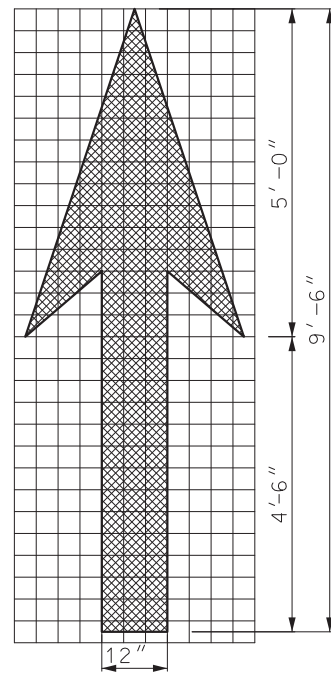
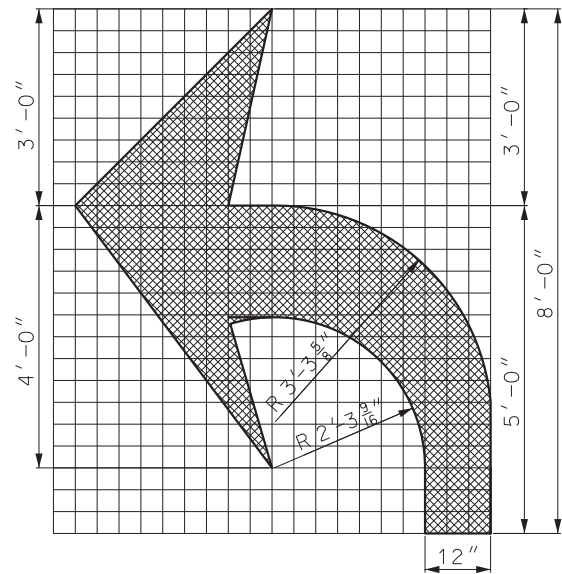
|                                                                                                                                                                                                                                  |                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                |
| <br><i>Mark Croarkin</i><br>04/08/2025 4:52:27 PM<br>MARK E. CROARKIN - CIVIL<br>MO-PE-2002016640                                           | <b>PAVEMENT MARKING<br/>STRIPING THROUGH<br/>RUMBLE STRIPS</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/13/2025                                                                                                                                                                             | 620.00P                                                        |
| SHEET NO.<br>4 OF 6                                                                                                                                                                                                              |                                                                |

\* = LATERAL DEVIATION SHALL NOT EXCEED ONE INCH IN 100 FEET.



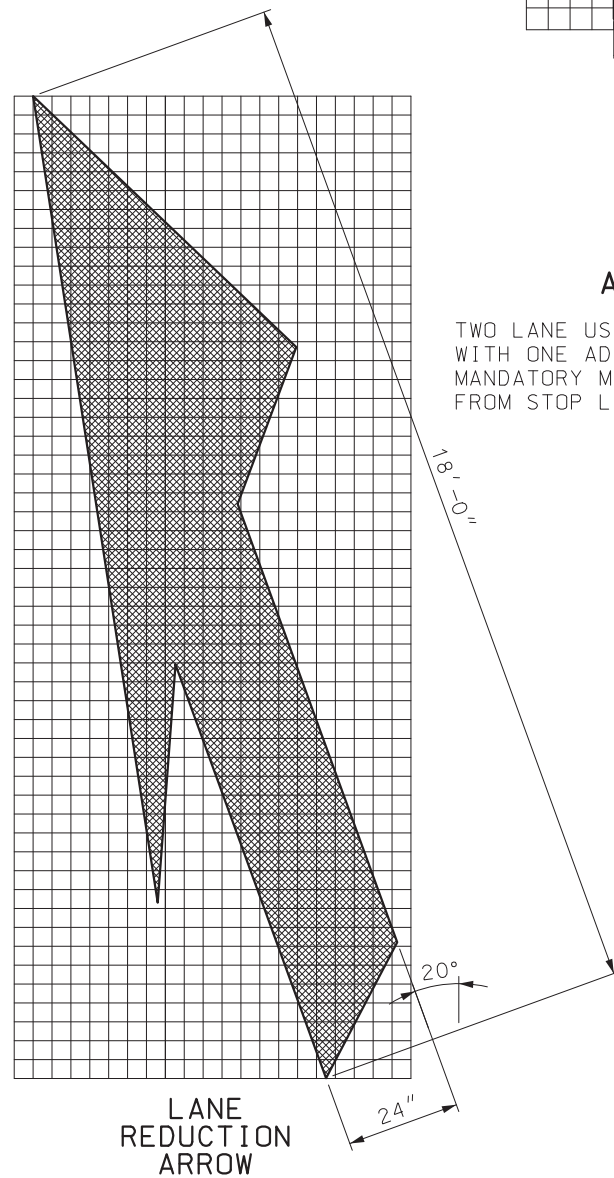


WORD MARKING

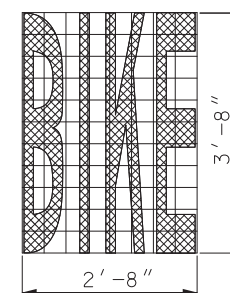
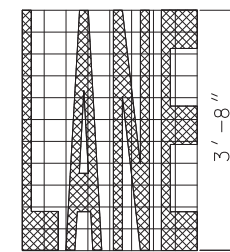


ARROW MARKINGS

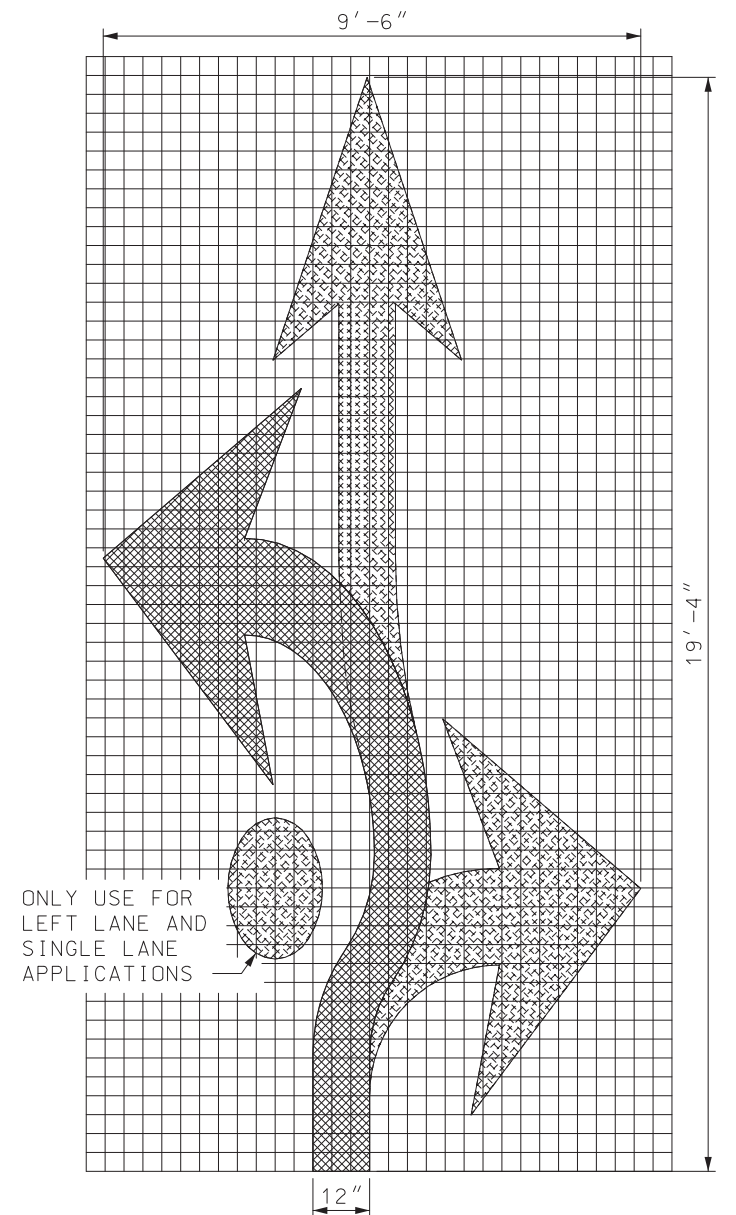
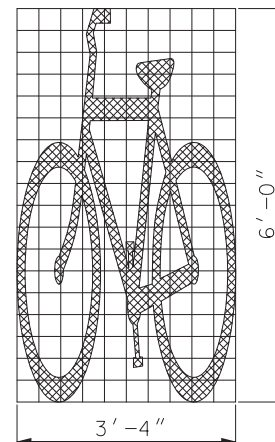
TWO LANE USE CONTROL ARROWS FOR FIRST 200 FEET WITH ONE ADDITIONAL ARROW EVERY 400 FEET OF MANDATORY MOVEMENT LANE. FIRST ARROW 75 FEET FROM STOP LINE.



LANE REDUCTION ARROW

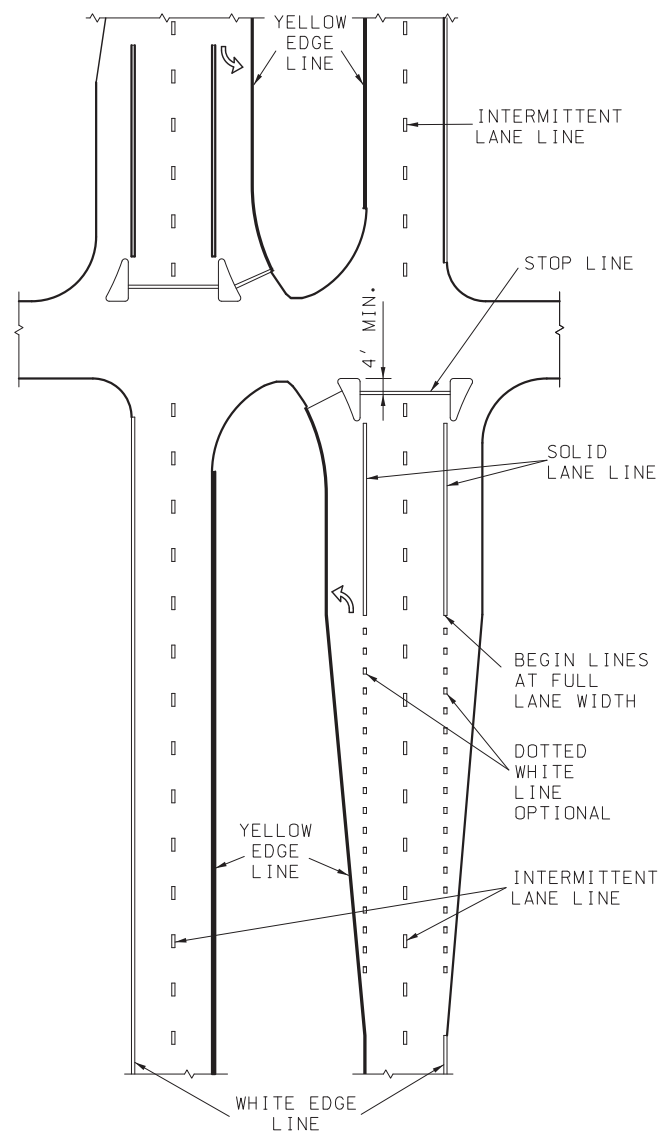


ELONGATED BICYCLE SYMBOL & WORD MARKINGS

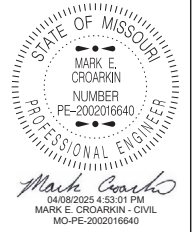


ONLY USE FOR LEFT LANE AND SINGLE LANE APPLICATIONS

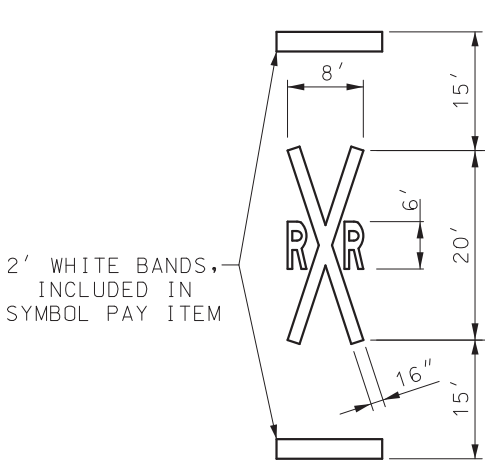
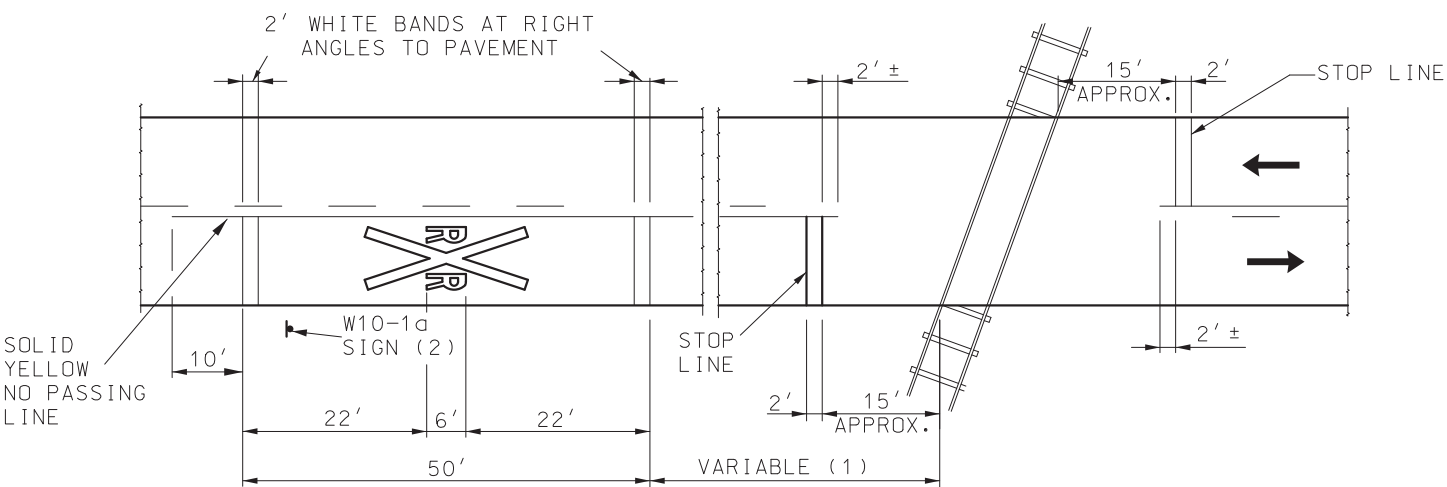
FISH-HOOK ARROW ROUNDABOUT APPROACH MARKINGS



SIGNALIZED GRADE INTERSECTION MARKING

|                                                                                                                                                                                                           |                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                                                              |                             |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                                                                          |                             |
| <br>Mark E. Chorkin<br>Professional Engineer<br>04/08/2025 4:53:01 PM<br>MARK E. CHORKIN - CIVIL<br>MO-PE-2002016640 | <b>PAVEMENT MARKING</b>     |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/13/2025                                                                                                                                                      | 620.00P<br>SHEET NO. 5 OF 6 |

NOTE: STOP LINES SHALL BE PLACED 90° TO THE ROADWAY. IF RAILROAD GATE IS PRESENT, THE STOP LINE SHALL BE PLACED 8' FROM GATE.

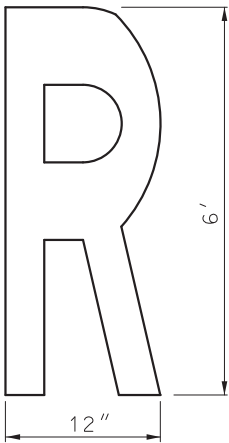


SYMBOL DETAIL

PAVEMENT DETAIL

(1) THE DISTANCE FROM THE RAILROAD CROSSING MARKING TO THE NEAREST TRACK WILL VARY ACCORDING TO THE APPROACH SPEED AND THE SIGHT DISTANCE OF THE VEHICULAR TRAFFIC APPROACHING, BUT SHALL BE NO LESS THAN 50 FEET. A THREE-LANE ROADWAY SHALL BE MARKED WITH A CENTERLINE FOR TWO-LANE APPROACH OPERATION ON THE APPROACH TO A CROSSING. ON MULTI-LANE ROADWAYS THE TRANSVERSE BANDS SHALL EXTEND ACROSS ALL APPROACH LANES, AND INDIVIDUAL "R X R" SYMBOLS SHALL BE USED IN EACH APPROACH LANE.

(2) PLACEMENT OF W10-1a SIGN BY OTHERS.

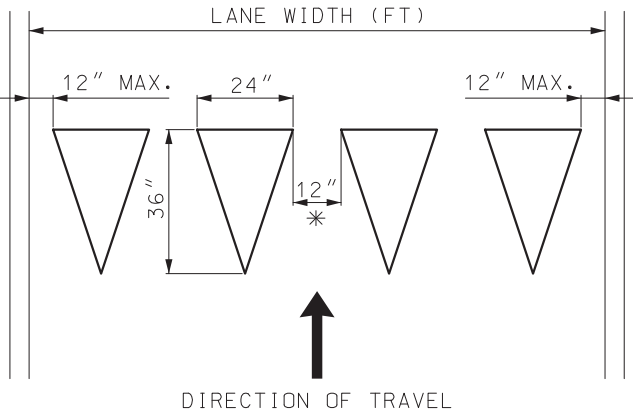


LETTER DETAIL

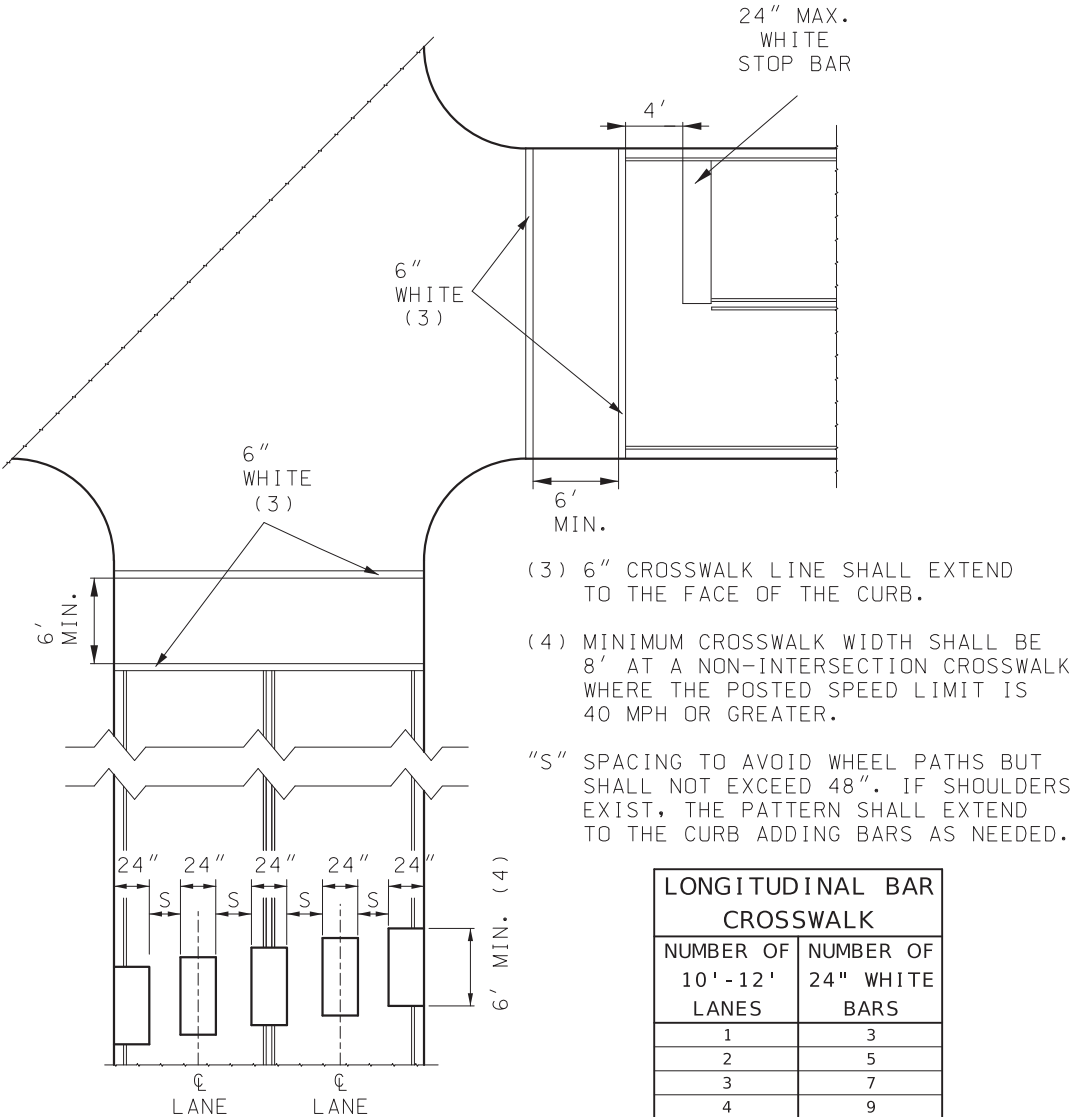
RAILROAD GRADE CROSSING

| YIELD LINE |                     |
|------------|---------------------|
| LANE WIDTH | NUMBER OF TRIANGLES |
| 10*        | 4                   |
| 11         |                     |
| 12         |                     |
| 13         |                     |
| 14         | 5                   |
| 15         |                     |
| 16         |                     |
| 17         | 6                   |
| 18         |                     |
| 19         |                     |
| 20         | 7                   |
| 21         |                     |
| 22         |                     |

\* USE 8" SPACING ON 10' LANE



WHITE YIELD LINE TRIANGLES



| LONGITUDINAL BAR CROSSWALK |                          |
|----------------------------|--------------------------|
| NUMBER OF 10'-12' LANES    | NUMBER OF 24" WHITE BARS |
| 1                          | 3                        |
| 2                          | 5                        |
| 3                          | 7                        |
| 4                          | 9                        |
| 5                          | 11                       |

PEDESTRIAN CROSSWALKS



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

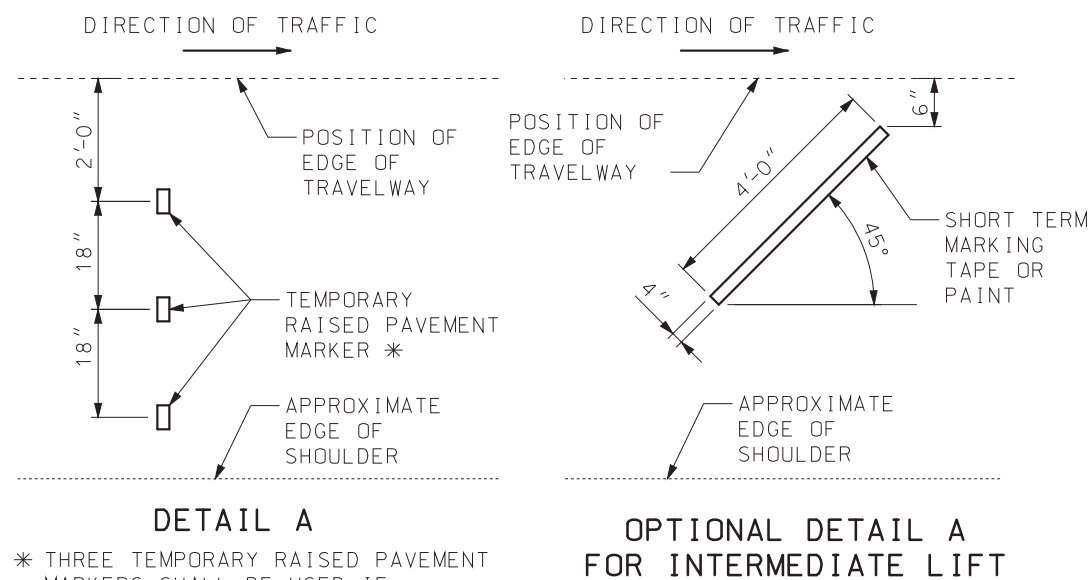
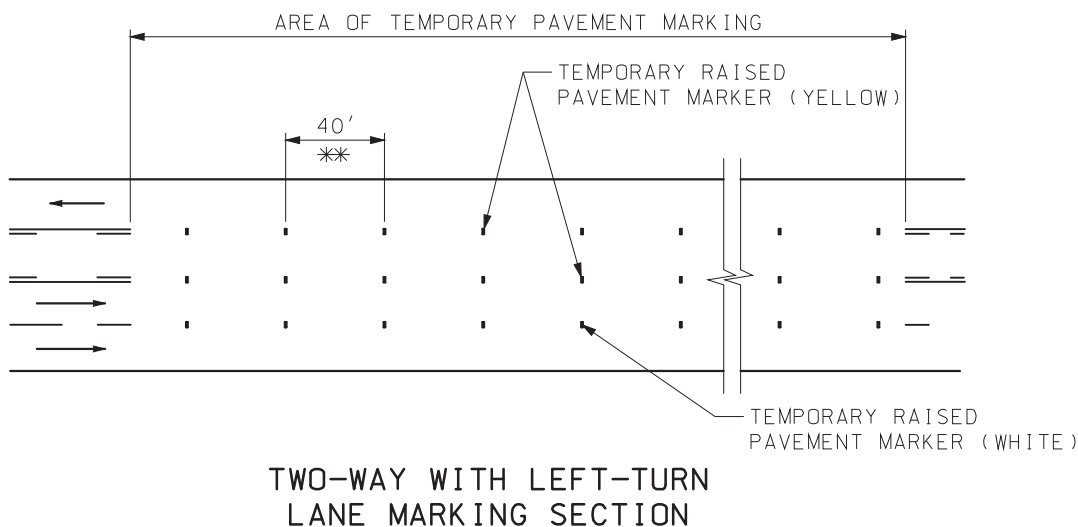
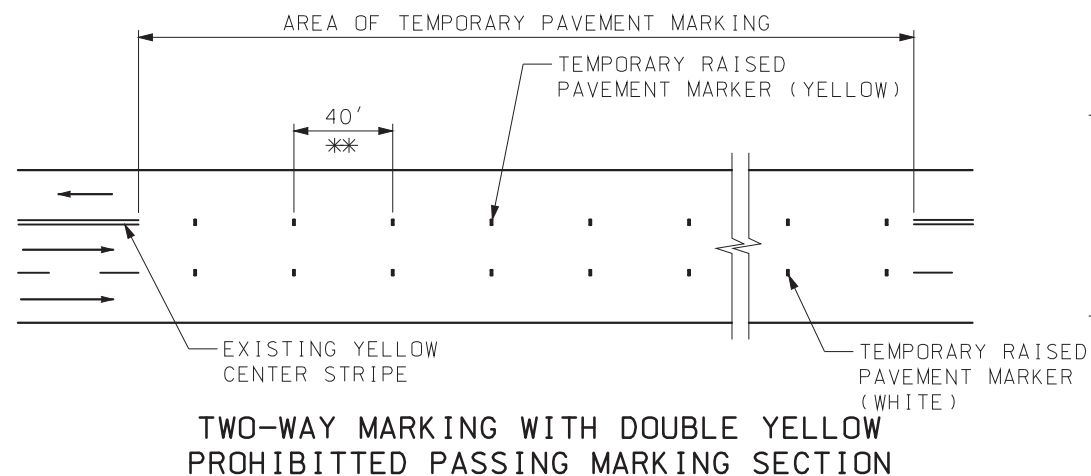


PAVEMENT MARKING

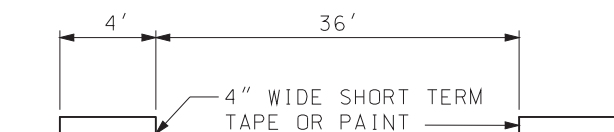
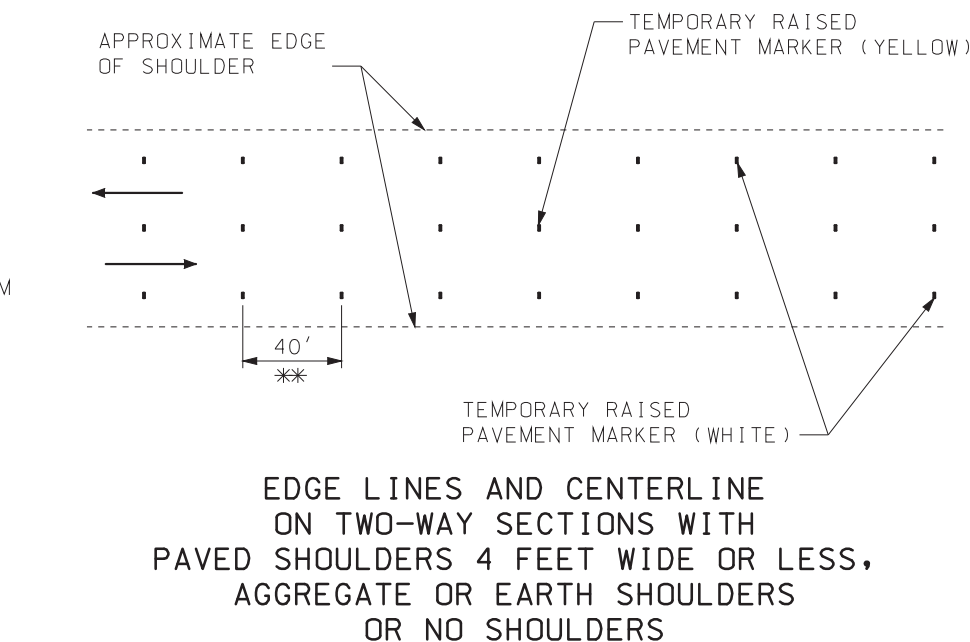
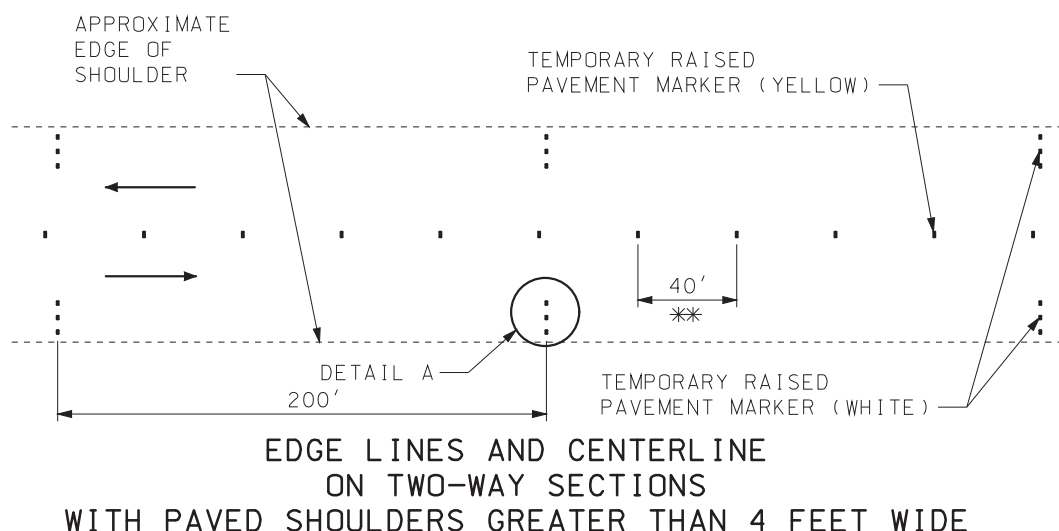
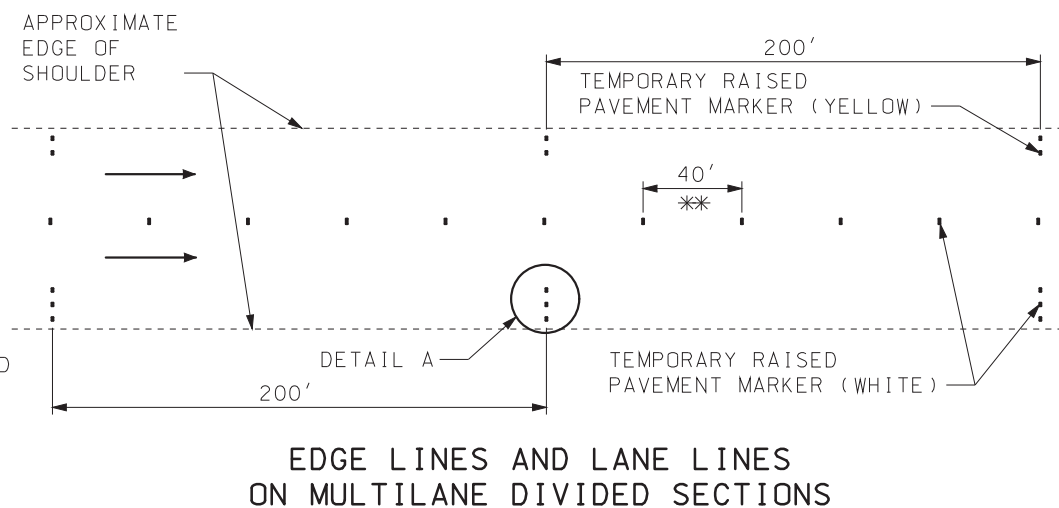
DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/13/2025

620.00P

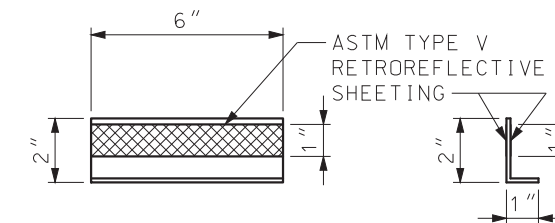
SHEET NO.  
6 OF 6



\* THREE TEMPORARY RAISED PAVEMENT MARKERS SHALL BE USED IF SHOULDER IS 6' OR WIDER. OTHERWISE, USE TWO TEMPORARY RAISED PAVEMENT MARKERS.



**\*\* OPTIONAL TEMPORARY PAVEMENT MARKING DETAIL FOR INTERMEDIATE LIFTS**



**ELEVATION SIDE**

**TYPICAL TEMPORARY RAISED PAVEMENT MARKER DETAIL**

#### GENERAL NOTES:

TEMPORARY PAVEMENT MARKING IS REQUIRED WHEN 200 CONSECUTIVE LINEAR FEET OR MORE OF PERMANENT PAVEMENT MARKING HAS BEEN OBLITERATED, OR AS DIRECTED BY THE ENGINEER.

TEMPORARY RAISED PAVEMENT MARKERS (TRPMS), OR THE OPTIONAL 4"X 4' SHORT TERM TAPE OR PAINT, WHEN ALLOWED, SHALL BE MAINTAINED IN PLACE AND RETROREFLECTIVE UNTIL THE PERMANENT PAVEMENT MARKINGS ARE INSTALLED. MISSING OR NON-REFLECTIVE MARKINGS SHALL BE REPLACED AT NO ADDITIONAL COST TO THE COMMISSION WHEN 10% OR MORE ARE DEFICIENT WITHIN ONE MILE OR WHEN 4 OR MORE CONSECUTIVE MARKINGS ARE DEFICIENT.

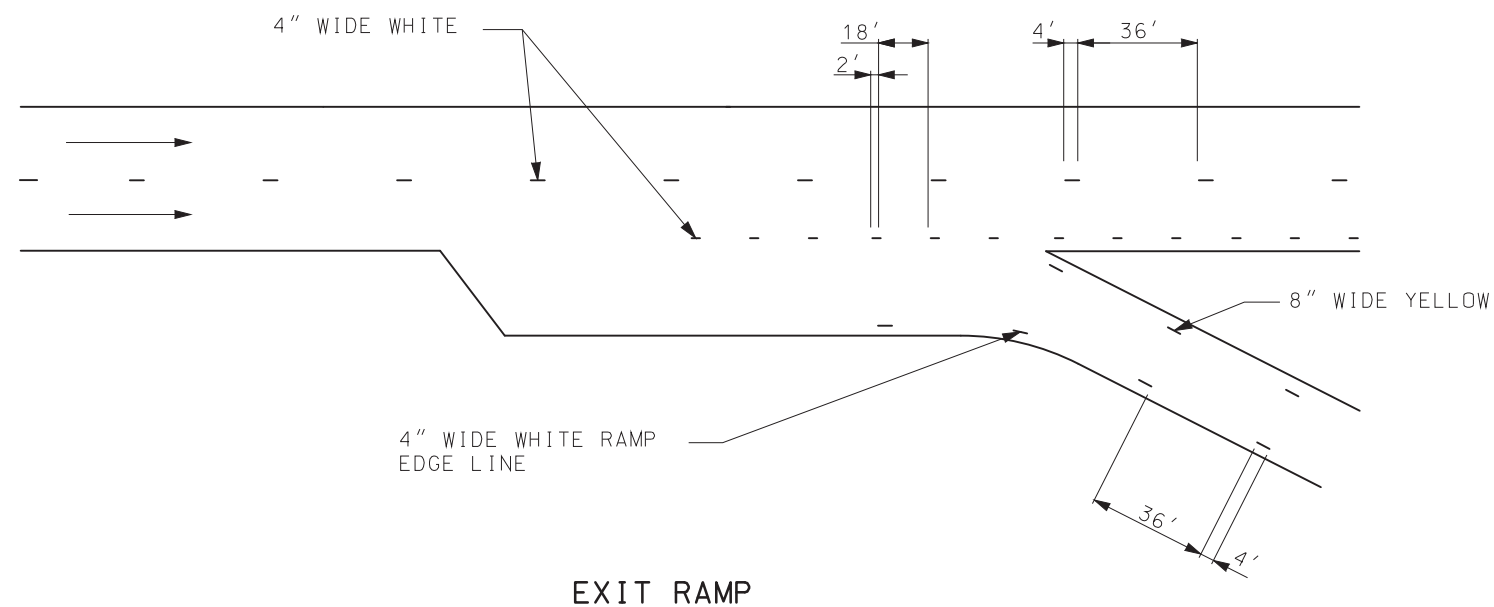
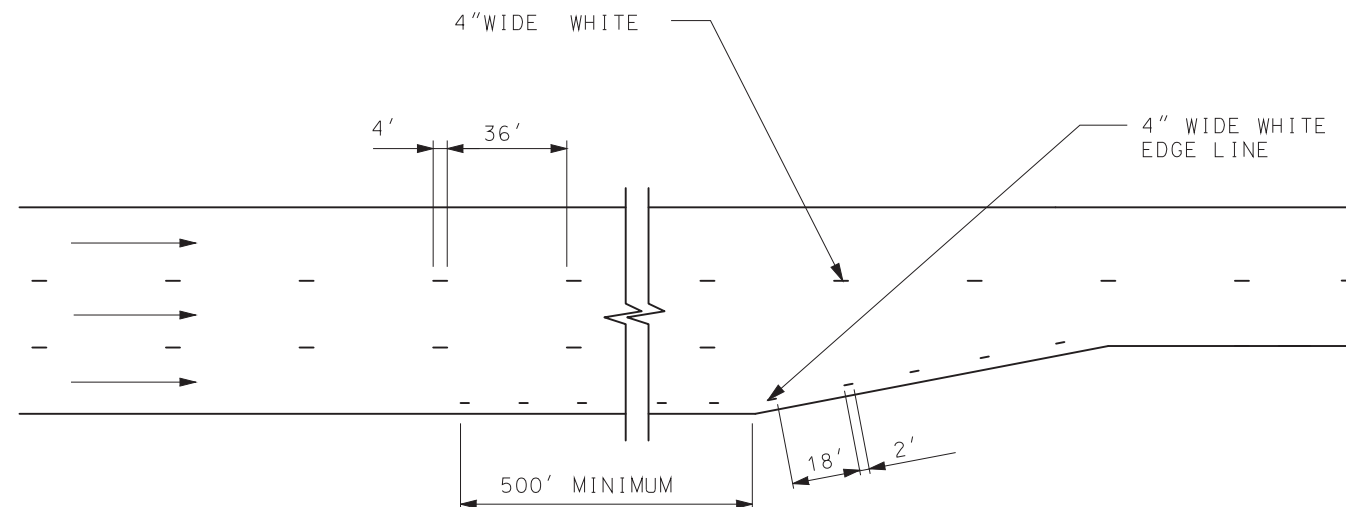
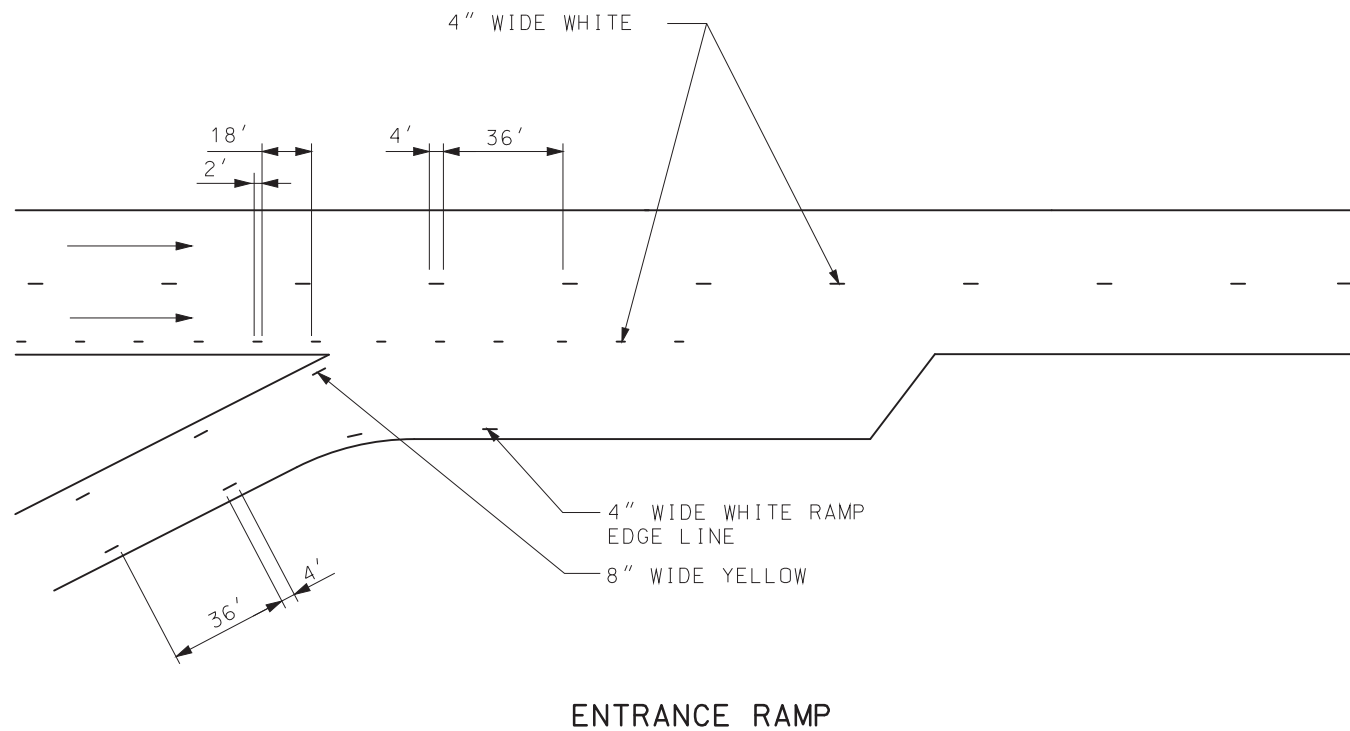
FOR INTERMEDIATE LIFTS, 4"X 4' SHORT TERM TAPE OR TEMPORARY PAINT MAY BE USED IN LIEU OF TRPMS.

TRPMS USED ON INTERMEDIATE LIFTS SHALL BE REMOVED PRIOR TO PLACEMENT OF THE NEXT LIFT.

ALL TEMPORARY MARKINGS SHALL BE REMOVED BY THE CONTRACTOR AFTER INSTALLATION OF PERMANENT MARKINGS, EXCEPT WHEN PERMANENT MARKINGS ARE TO BE INSTALLED BY OTHERS.

TEMPORARY TAPE SHALL NOT BE USED FOR TEMPORARY MARKING ON THE FINAL SURFACE EXCEPT WHEN SPECIFIED IN THE PLANS.

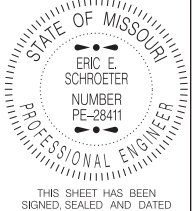
|                                                                                                                                                                  |                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>          |                                                                                   |
| <p>STATE OF MISSOURI<br/>ERIC E. SCHROETER<br/>NUMBER PE-28411<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>TEMPORARY PAVEMENT MARKING</b></p> <p><b>TEMPORARY PAVEMENT MARKING</b></p> |
| <p>DATE EFFECTIVE: 07/01/2017</p> <p>DATE PREPARED: 5/1/2017</p>                                                                                                 | <p>620.10G</p> <p>SHEET NO. 1 OF 5</p>                                            |



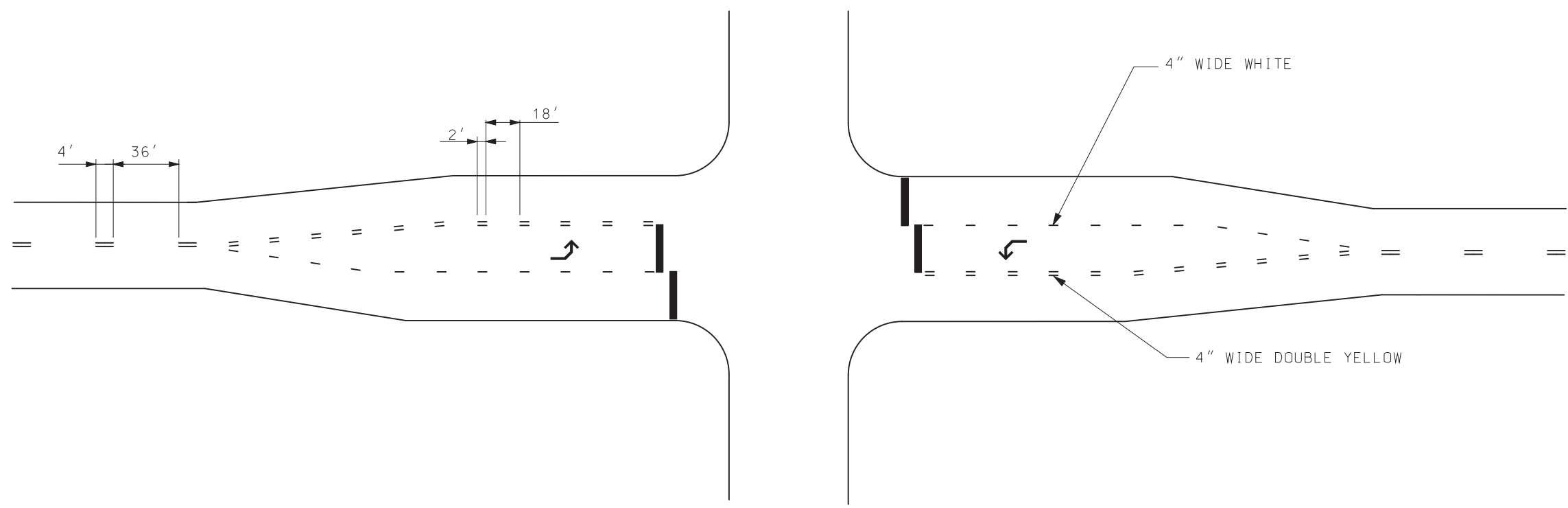
#### GENERAL NOTES:

TEMPORARY PAVEMENT MARKING IN INTERSECTIONS, RAMPS GORES AND OTHER TRANSITION AREAS USE AN INTERMITTENT MARKING OF 2 FEET LONG AT A CYCLE OF 20 FEET.

LIMITS OF TEMPORARY GORE MARKING ARE THE SAME AS THE EXISTING GORE LINES.

|                                                                                                                                                                                                                                                                |                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                               |                                                                                     |
|  <p>STATE OF MISSOURI<br/>ERIC E. SCHROETER<br/>NUMBER PE-28411<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p><b>TEMPORARY PAVEMENT<br/>MARKING<br/>LANE TRANSITION AND<br/>RAMP AREAS</b></p> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                                                          | 620.10G                                                                             |
| SHEET NO.<br>2 OF 5                                                                                                                                                                                                                                            |                                                                                     |

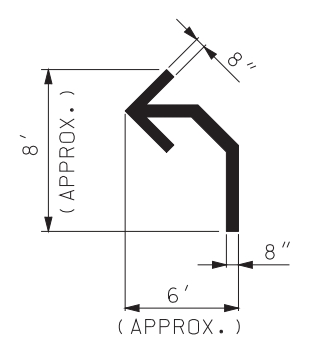




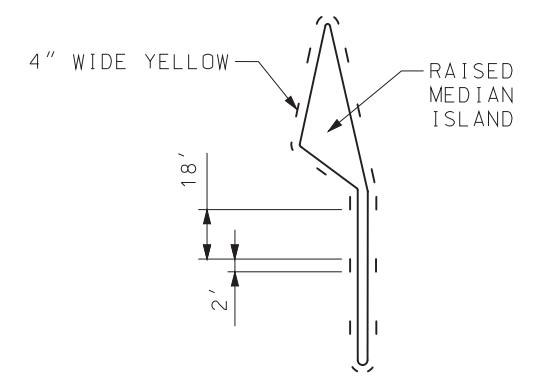
PLAN VIEW



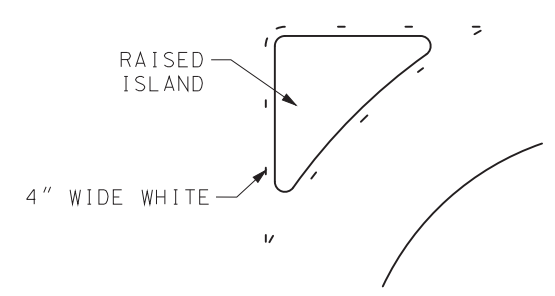
TEMPORARY STOP  
BAR DETAIL (WHITE)



TEMPORARY ARROW  
DETAIL (WHITE)



RAISED DIVISIONAL  
ISLAND



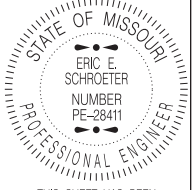
RAISED CHANNELIZING  
ISLAND

GENERAL NOTES:

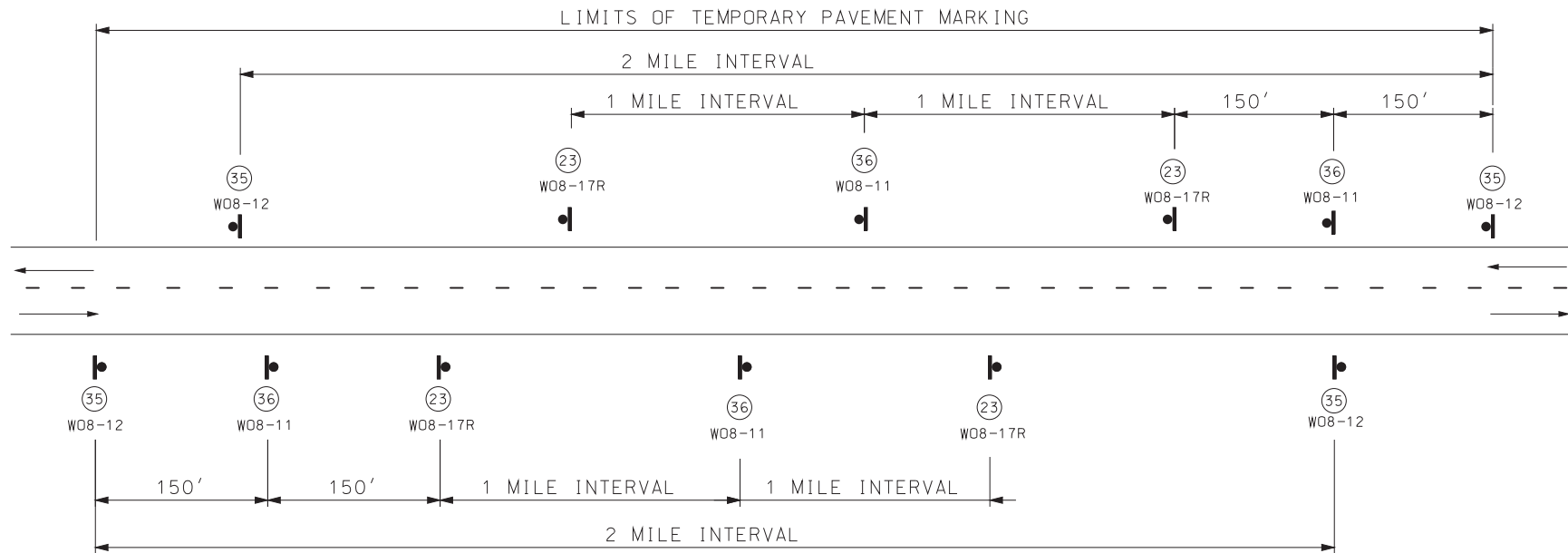
TEMPORARY ARROWS AND STOP BARS ARE REQUIRED WHEN GOEMETRIC MODIFICATIONS DURING CONSTRUCTION CREATE LANE CONFIGURATIONS DIFFERENT THAN EXISTING, OR THE EXISTING PAVEMENT MARKING INCLUDES THEM.

YELLOW AND WHITE TEMPORARY MARKING AROUND ISLANDS ONLY REQUIRED WHEN THE ISLAND CURB IS NOT PAINTED.

TEMPORARY PAVEMENT MARKING IN INTERSECTIONS, RAMP GORES AND OTHER TRANSITION AREAS USE AN INTERMITTENT MARKING 2' LONG AT A CYCLE OF 20'.

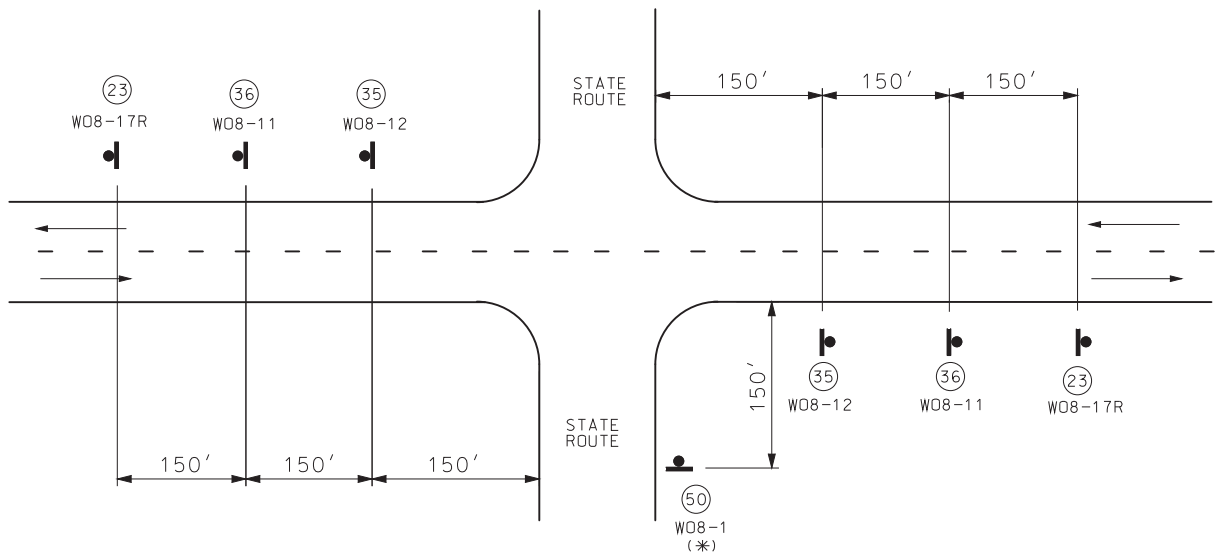
|                                                                                                                                                                                                                                  |                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                               |
|                                                                                                                                             | <p align="center"><b>TEMPORARY PAVEMENT<br/>MARKING<br/>INTERSECTIONS</b></p> |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            | 620.10G                                                                       |
| SHEET NO.<br>3 OF 5                                                                                                                                                                                                              |                                                                               |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



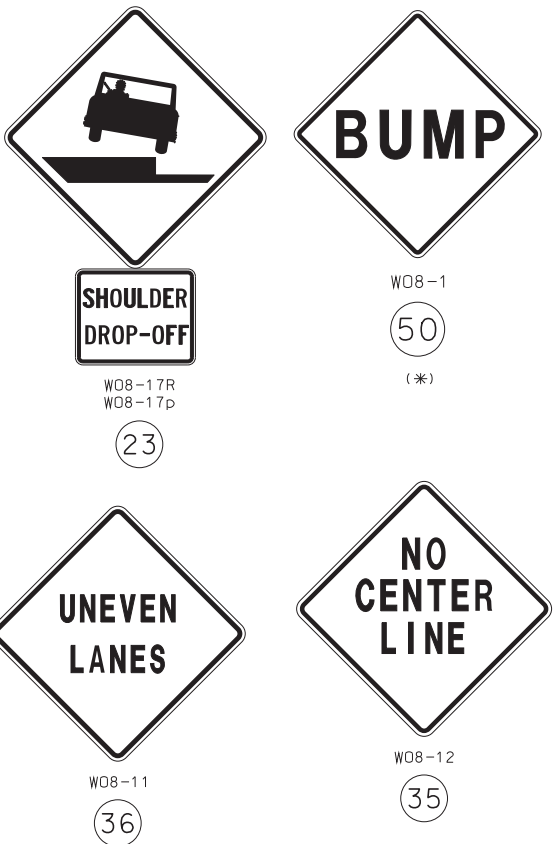
SIGN SPACING FOR MAINLINE

(DETAIL SHOWN IS BASED ON A PROJECT MEETING ALL CONDITIONS: NO CENTER STRIPE, UNEVEN LANES, SHOULDER DROP-OFF AND BUMP.)  
WHEN BOTH UNEVEN LANES AND SHOULDER DROP-OFF SIGNS ARE USED, BOTH SIGNS SHALL STAY IN PLACE UNTIL BOTH CONDITIONS NO LONGER EXIST.  
IF ONLY ONE CONDITION EXISTS (UNEVEN LANES OR SHOULDER DROP-OFF), THE SIGN SPACING SHALL BE AT 1 MILE INTERVALS.



SIGN SPACING AT STATE ROUTE INTERSECTIONS

(\*) BUMP SIGN SHOULD BE IN ACCORDANCE WITH STANDARD PLAN 619.10.



GENERAL NOTES:

FOR DETAILS OF TEMPORARY PAVEMENT MARKING, SEE SHEET 1 OF 5.

SIGN (35) AND TEMPORARY PAVEMENT MARKING INSTALLED WHERE CENTERLINE STRIPING HAS BEEN COVERED OR REMOVED. SIGNS ARE TO REMAIN IN PLACE UNTIL THE PERMANENT CENTERLINE PAVEMENT MARKINGS ARE IN PLACE. SIGNS SHALL BE COVERED OR REMOVED WHEN PAVEMENT CENTERLINE MARKING HAS BEEN INSTALLED.

SIGN (35) IS PLACED AT APPROXIMATELY TWO-MILE INTERVALS AND AT STATE ROUTE JUNCTIONS. WHEN THE INSTALLATION AT A JUNCTION IS WITHIN ONE-EIGHTH MILE OF THE NORMAL MAINLINE SIGN (35), THE LATTER MAY BE ELIMINATED.

ALL SIGNS SHALL BE POST MOUNTED AND IN ACCORDANCE WITH STANDARD PLAN 616.10 AND 903.03.

WHEN SHOULDER DROP-OFF SIGNS ARE IN PLACE FOR GREATER THAN THREE DAYS, THE SHOULDER DROP-OFF PLAQUE SHOULD BE USED IN ADDITION WITH THE SHOULDER DROP-OFF SIGN.

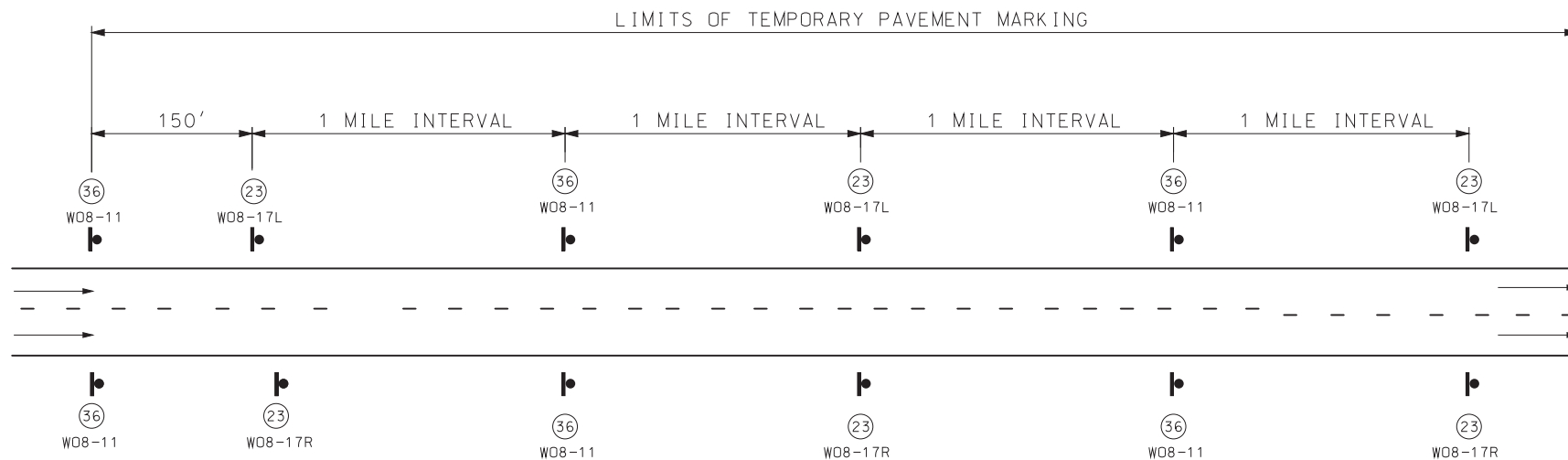
**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

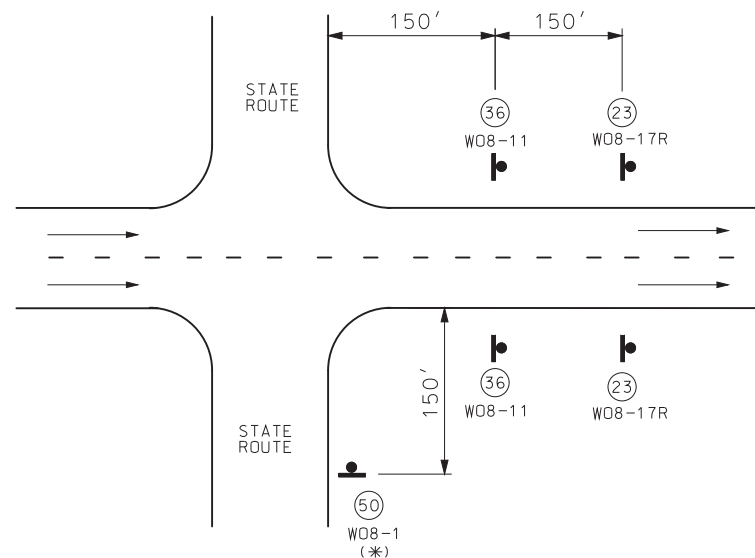
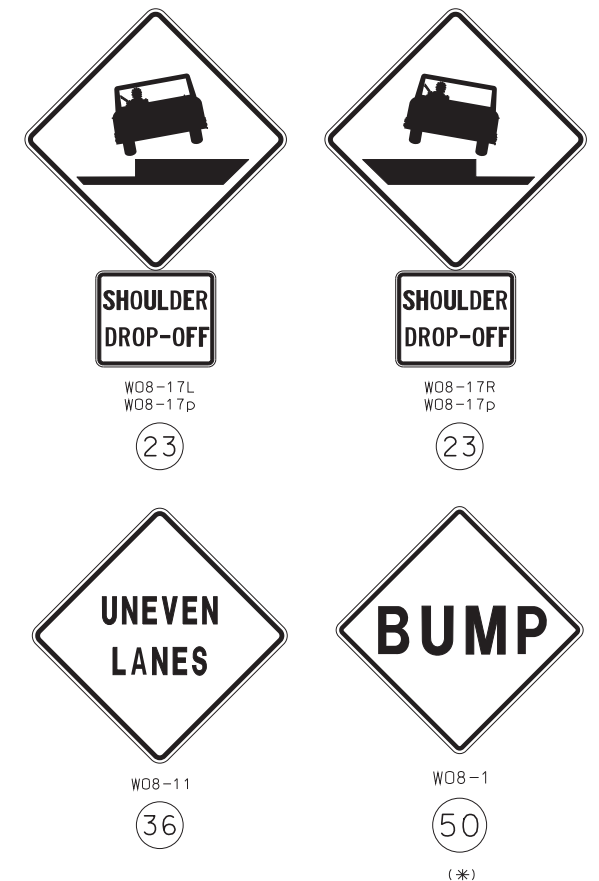
**TEMPORARY PAVEMENT MARKING**

**TWO-LANE TWO-WAY HIGHWAY**

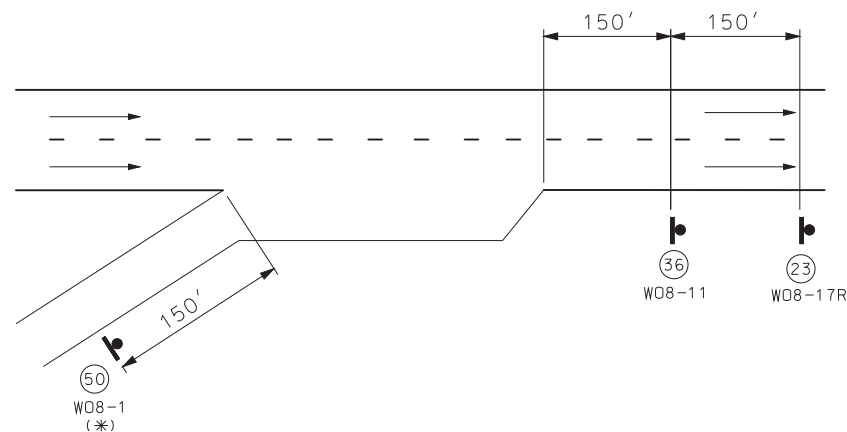
|                            |         |                     |
|----------------------------|---------|---------------------|
| DATE EFFECTIVE: 07/01/2017 | 620.10G | SHEET NO.<br>4 OF 5 |
| DATE PREPARED: 5/1/2017    |         |                     |



**SIGN SPACING FOR DIVIDED OR MULTI-LANE HIGHWAY**  
 (DETAIL SHOWN IS BASED ON A PROJECT MEETING CONDITIONS OF UNEVEN LANES AND SHOULDER DROP-OFF.)  
 WHEN BOTH UNEVEN LANES AND SHOULDER DROP-OFF SIGNS ARE USED, BOTH SIGNS SHALL STAY IN PLACE UNTIL BOTH CONDITIONS NO LONGER EXISTS.  
 WHEN ONLY ONE CONDITION EXISTS (UNEVEN LANES OR SHOULDER DROP-OFF), SIGN SPACING SHALL BE AT 1 MILE INTERVALS



**SIGN SPACING AT STATE ROUTE INTERSECTIONS**  
 (\*) BUMP SIGN SHOULD BE IN ACCORDANCE WITH STANDARD PLAN 619.10.



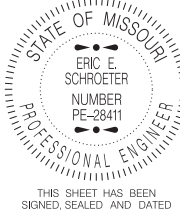
**SIGN SPACING AT RAMPS**  
 (\*) BUMP SIGN SHOULD BE IN ACCORDANCE WITH STANDARD PLAN 619.10.

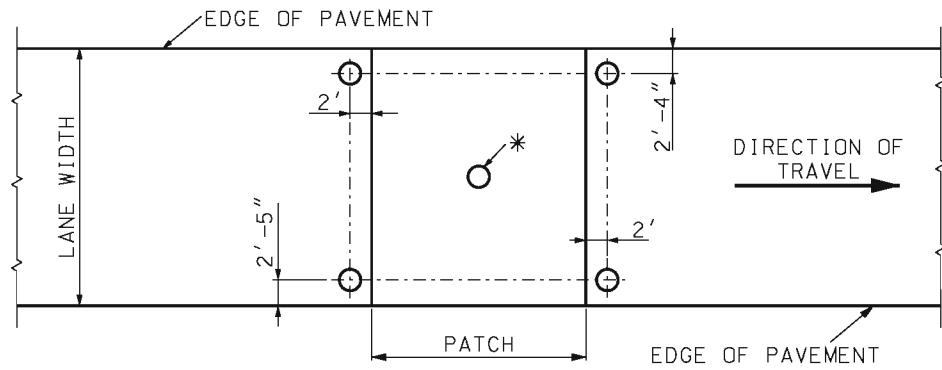
**GENERAL NOTES:**

FOR DETAILS OF TEMPORARY PAVEMENT MARKING, SEE SHEET 1 OF 5.

ALL SIGNS SHALL BE POST MOUNTED AND IN ACCORDANCE WITH STANDARD PLANS 616.10 AND 903.03.

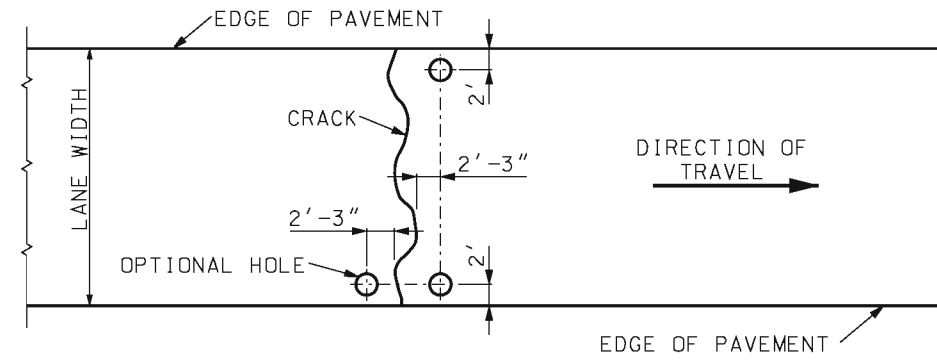
WHEN SHOULDER DROP-OFF SIGNS ARE IN PLACE FOR GREATER THAN THREE DAYS, THE SHOULDER DROP-OFF PLAQUE SHOULD BE USED IN ADDITION WITH THE SHOULDER DROP-OFF SIGN.

|                                                                                                                                                                                                                                  |  |                                                                                             |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------|--|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |                                                                                             |  |
|                                                                                                                                             |  | <b>TEMPORARY PAVEMENT MARKING<br/>         DIVIDED AND MULTI-LANE<br/>         HIGHWAYS</b> |  |
| DATE EFFECTIVE: 07/01/2017<br>DATE PREPARED: 5/1/2017                                                                                                                                                                            |  | SHEET NO.<br><b>620.10G 5 OF 5</b>                                                          |  |

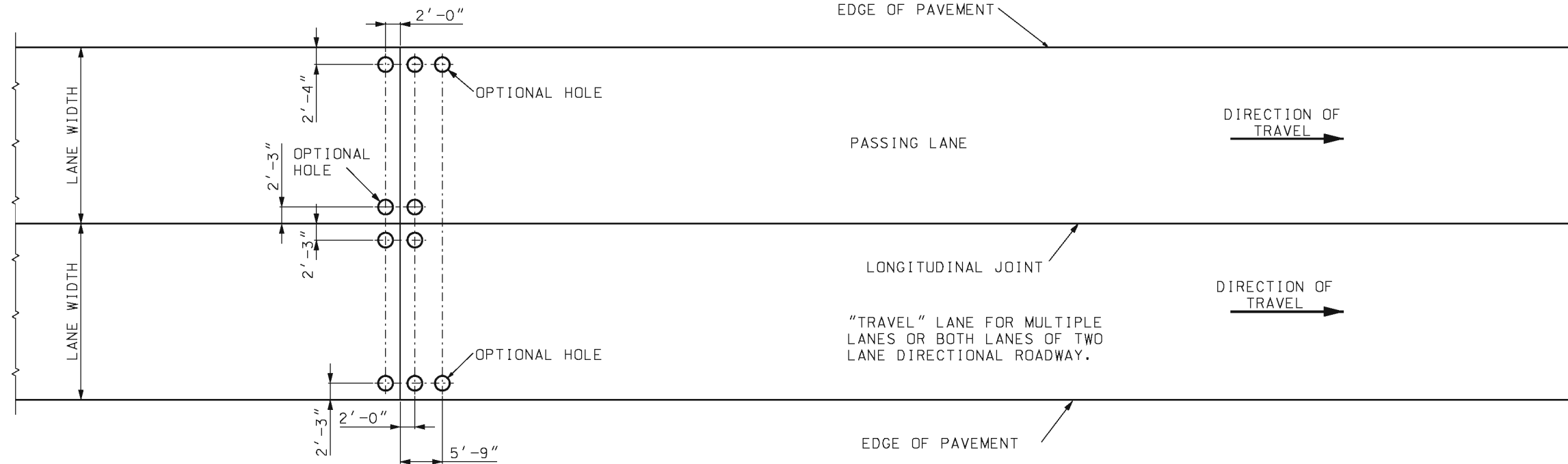


**PATCH**

\* THIS HOLE SHOULD ONLY BE USED ON PATCHES EXISTING PRIOR TO CONSTRUCTION. THE HOLE SHOULD BE LOCATED CLOSE TO THE CENTER OF THE PATCH. BY USING THIS HOLE, THE TWO HOLES LOCATED AT THE SHOULDER COULD BE ELIMINATED.

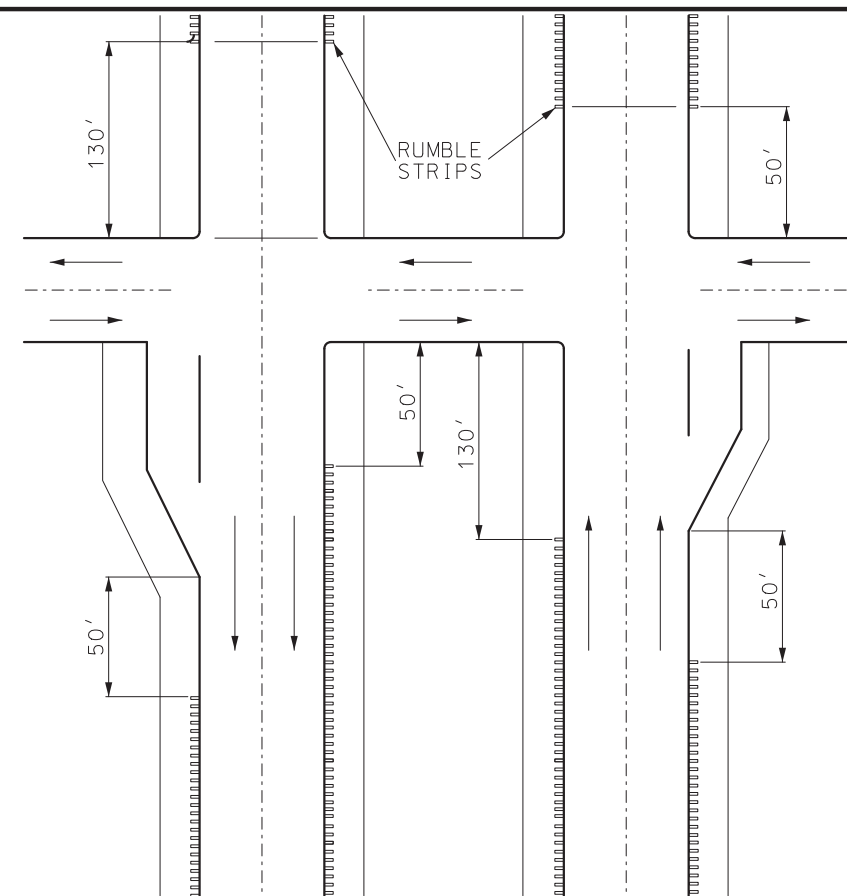


**CRACK**

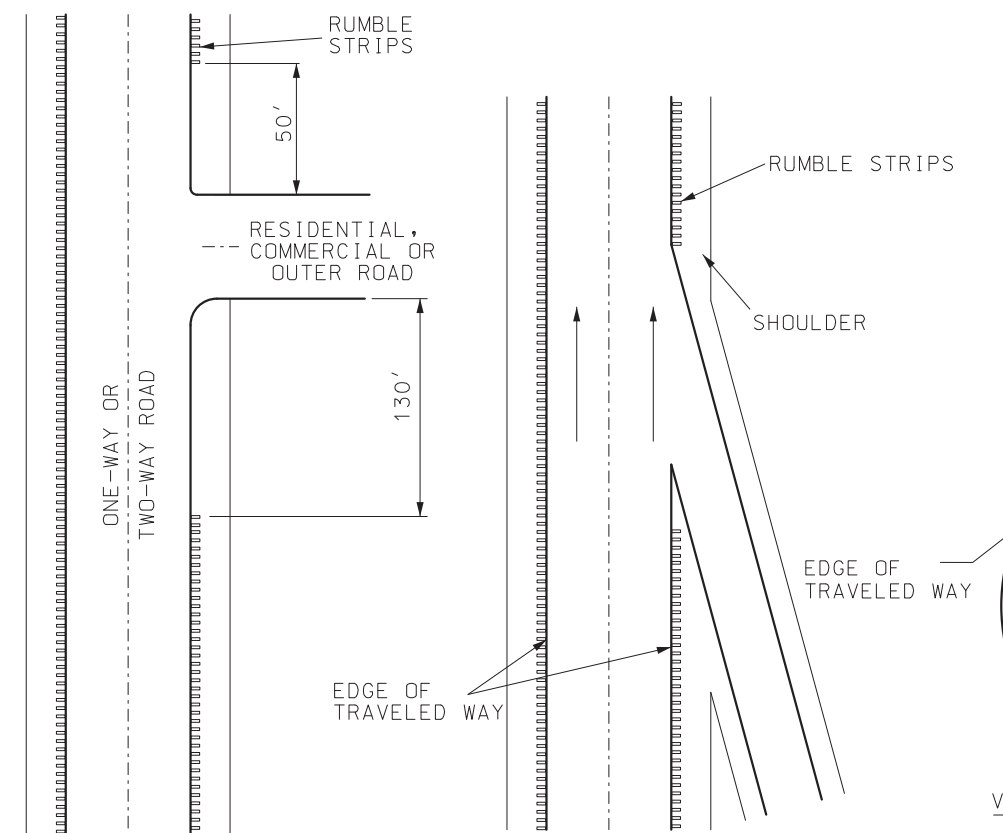


**JOINT**

|                                                                                                                                                                                                                                  |                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                     |
|                                                                                                                                             | <b>HOLE PATTERN FOR PAVEMENT SLAB STABILIZATION</b> |
| DATE EFFECTIVE: 10/01/1998<br>DATE PREPARED: 8/21/2009                                                                                                                                                                           | <b>625.00</b>                                       |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                                     |



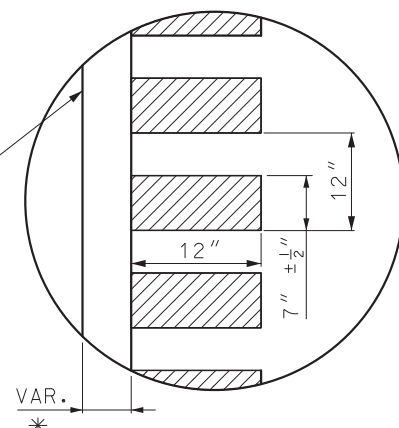
EXPRESSWAY DIVIDED



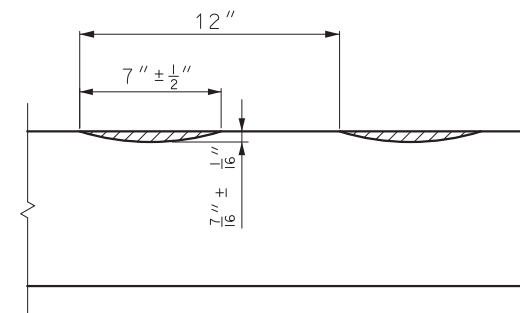
INTERSECTIONS

ACCELERATION OR DECELERATION LANE

RUMBLE STRIP LAYOUTS



RUMBLE STRIP  
PLAN VIEW



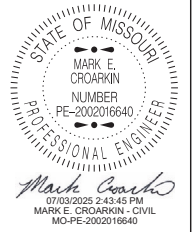
RUMBLE STRIP CROSS SECTION VIEW

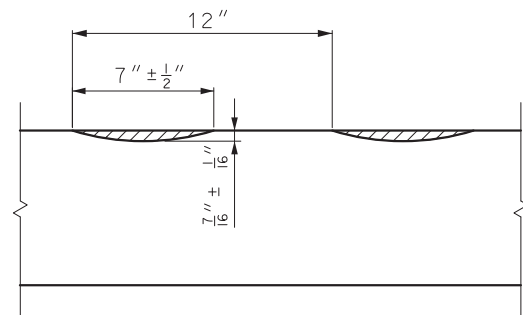
|                                                                     |  |
|---------------------------------------------------------------------|--|
| 14' PAVEMENT<br>STRUCTURES,<br>ALL SHOULDER TYPES                   |  |
| 13' PAVEMENT<br>STRUCTURES,<br>ALL SHOULDER TYPES                   |  |
| PAVEMENT<br>STRUCTURES ≤ 12'<br>WITH A2 SHOULDER                    |  |
| PAVEMENT<br>STRUCTURES ≤ 12'<br>WITH A3 SHOULDER                    |  |
| PAVEMENT<br>STRUCTURES ≤ 12'<br>WITH EARTH OR<br>AGGREGATE SHOULDER |  |

\* = LATERAL DEVIATION SHALL NOT  
EXCEED ONE INCH IN 100 FEET.

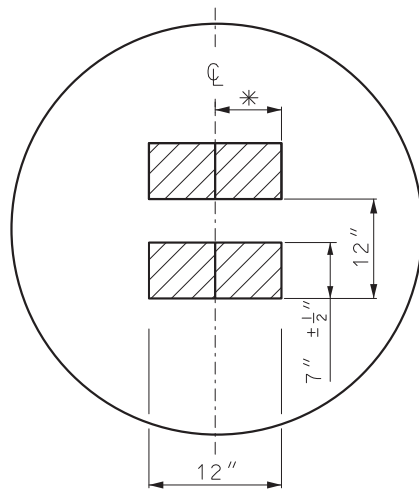
GENERAL NOTES:

- SEE STANDARD PLAN 620.00 FOR PAVEMENT MARKING.
- RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGES.
- ALL RUMBLE STRIPS SHALL BE MILLED.
- RUMBLE STRIPS SHALL NOT BE MILLED ONTO TRANSVERSE JOINTS.
- FOR CONCRETE PAVEMENT WITH 15' JOINT SPACING, AT LEAST TWELVE RUMBLE STRIPS SHALL BE MILLED PER PANEL.
- RUMBLE STRIPS SHALL BE OMITTED IF SHOULDERS ARE LESS THAN 2' WIDE.

|                                                                                                                                                                                                                                                            |                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                       |                                   |
| <br>MARK E. CROARKIN<br>NUMBER<br>PE-2002016640<br>PROFESSIONAL ENGINEER<br>Mark E. Croarkin<br>07/03/2025 2:43:45 PM<br>MARK E. CROARKIN - CIVIL<br>MO-PE-2002016640 | <b>RUMBLE STRIPS<br/>SHOULDER</b> |
| DATE EFFECTIVE: 10/1/2025<br>DATE PREPARED: 7/2/2025                                                                                                                                                                                                       | <b>626.00J</b>                    |
| SHEET NO.<br>1 OF 2                                                                                                                                                                                                                                        |                                   |

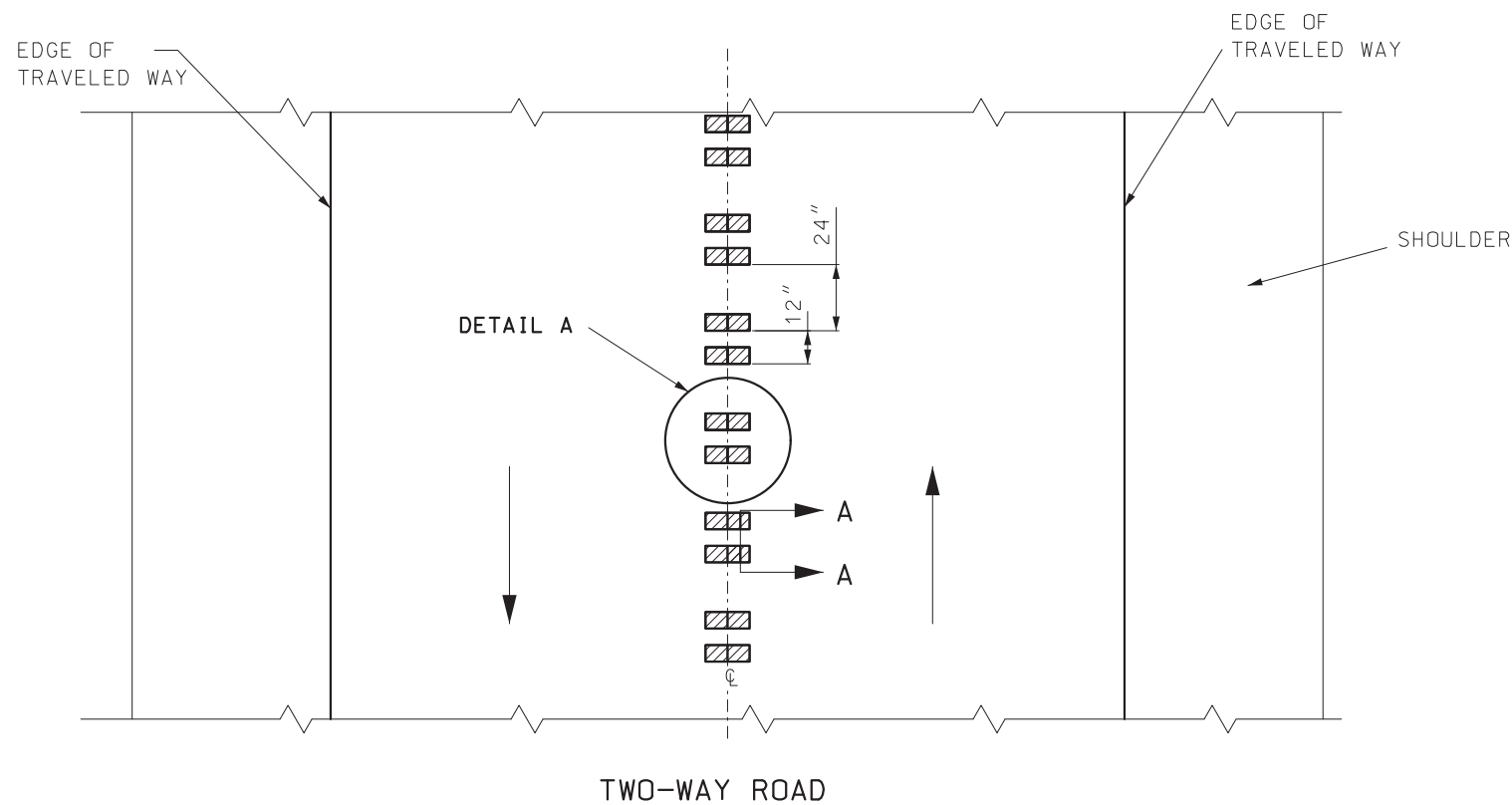


SECTION A-A



DETAIL A

\* = LATERAL DEVIATION SHALL NOT EXCEED ONE INCH IN 100 FEET.



GENERAL NOTES:

SEE STANDARD PLAN 620.00 FOR PAVEMENT MARKING.

RUMBLE STRIPS SHALL NOT BE PLACED ON BRIDGES.

ALL RUMBLE STRIPS SHALL BE MILLED.

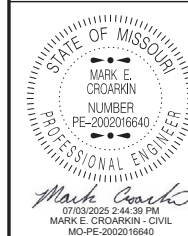
CENTERLINE RUMBLE STRIPS SHALL BE CONTINUOUS THROUGH CONNECTIONS OF SIDEROADS WITH NO LEFT TURN LANES.

DISCONTINUE CENTERLINE RUMBLE STRIPS THROUGH THE LIMITS OF ALL LEFT TURN LANES, INCLUDING ANY LANE TAPER SECTIONS.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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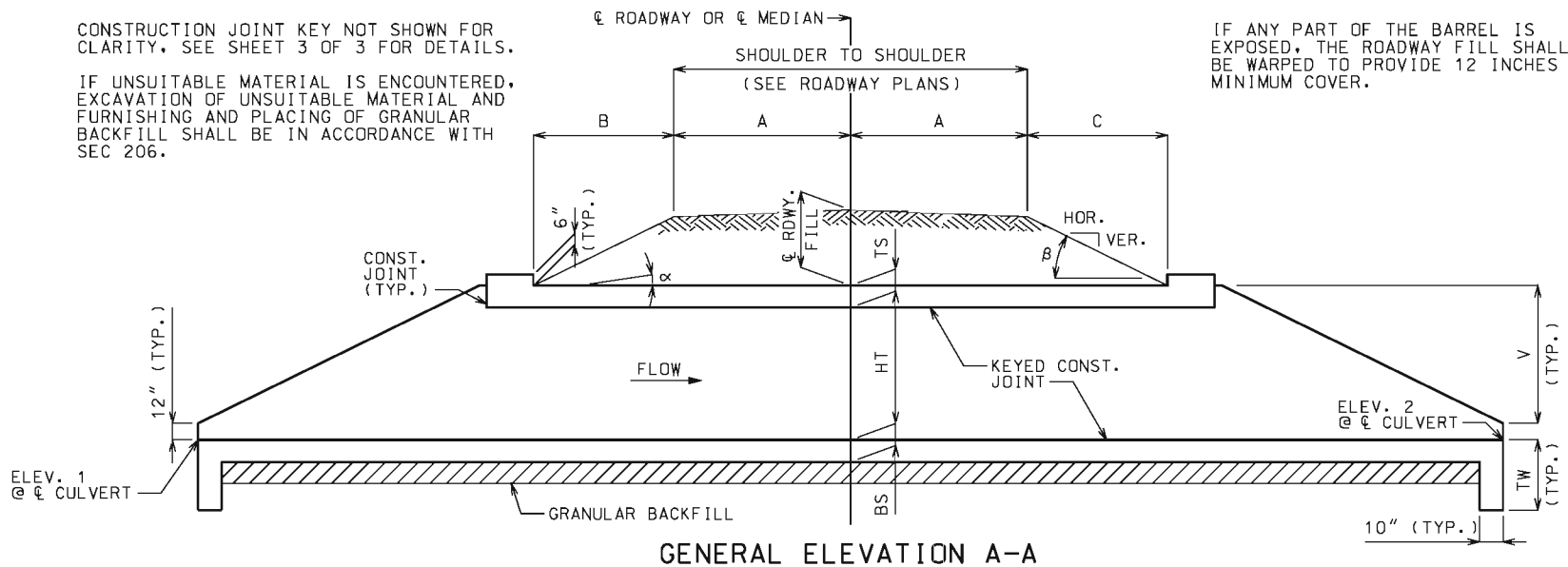


RUMBLE STRIPS  
CENTERLINE

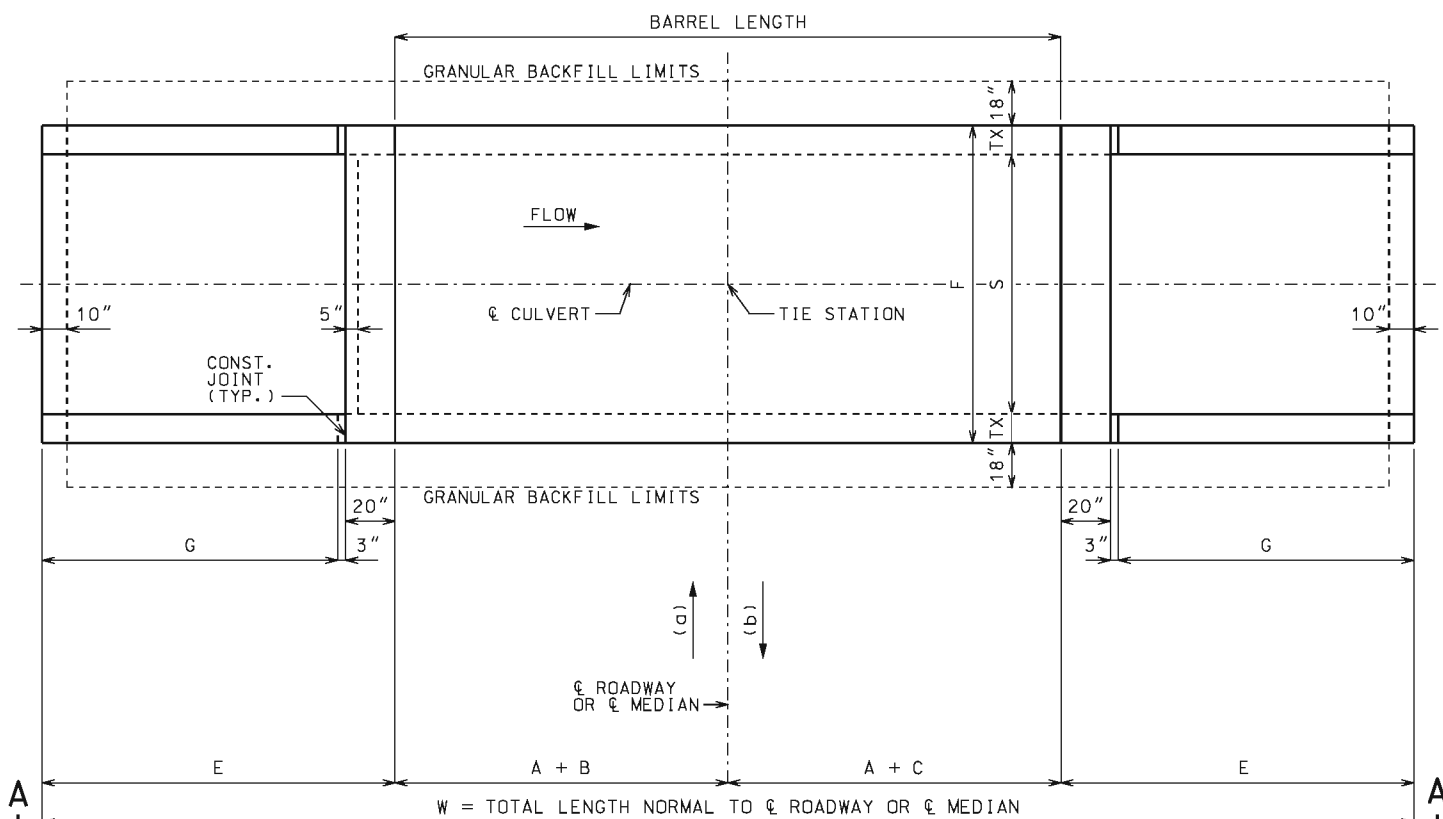
DATE EFFECTIVE: 10/1/2025  
DATE PREPARED: 7/2/2025

626.00J

SHEET NO.  
2 OF 2



CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.



(a) AHEAD STATION WHERE STREAM FLOWS LEFT TO RIGHT. (b) AHEAD STATION WHERE STREAM FLOWS RIGHT TO LEFT.

### EQUATIONS FOR COMPUTING $\alpha$ , $\beta$ , B AND C

$\alpha$  = ANGLE OF BARREL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN} \left( \frac{\text{ELEV. 1} - \text{ELEV. 2}}{W} \right)$

$\beta$  = ANGLE OF FILL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN} \left( \frac{\text{VER.}}{\text{HOR.}} \right)$

B = HORIZONTAL DISTANCE FROM UPSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL +  $A(\text{CS}) - A(\text{TAN}\alpha)$   
UPSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN  
 $\text{TAN}\beta + \text{TAN}\alpha$

C = HORIZONTAL DISTANCE FROM DOWNSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL +  $A(\text{CS}) + A(\text{TAN}\alpha)$   
DOWNSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN  
 $\text{TAN}\beta - \text{TAN}\alpha$

CS = CROSS SLOPE OF EACH PART OF ROADWAY INCLUDING CROWN, LANES AND SHOULDERS. CS IS POSITIVE IF RISING AND NEGATIVE IF FALLING AWAY FROM  $\phi$  ROADWAY OR  $\phi$  MEDIAN.

THE TERM " $A(\text{CS})$ " IS THE DIFFERENCE IN ELEVATION BETWEEN  $\phi$  ROADWAY OR  $\phi$  MEDIAN AND THE TOP OF THE FILL SLOPE NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN. THIS TERM SHALL BE ADJUSTED FOR UNSYMMETRICAL AND NONSTANDARD ROADWAYS.

TO ACCOUNT FOR A VARYING PROFILE GRADE THE  $\phi$  ROADWAY FILL SHALL BE BASED ON STATIONS THAT CORRESPOND TO THE CORNERS OF THE INSIDE FACE OF THE HEADWALLS THAT PRODUCE MAXIMUM VALUES FOR B AND C.

SEE ROADWAY PLANS FOR SLOPES,  $\phi$  ROADWAY FILL AND ELEVATIONS 1 AND 2. ELEVATIONS 1 AND 2 CORRESPOND TO UPPER AND LOWER FLOW LINE ELEVATIONS AND MAY BE BELOW THE NATURAL STREAM BOTTOM DUE TO ENVIRONMENTAL REQUIREMENTS.

### LAYOUT DIMENSIONS

| VARIABLE | DIMENSION                |
|----------|--------------------------|
| $\alpha$ | SEE EQUATIONS            |
| $\beta$  | SEE EQUATIONS            |
| B        | SEE EQUATIONS            |
| C        | SEE EQUATIONS            |
| E        | G + 23"                  |
| F        | S + 2TX                  |
| G        | 2V                       |
| V        | HT + TS - 12"            |
| W        | 2A + B + C + 2E          |
| TW       | MAX{3'-4" OR (BS + 12")} |

### GENERAL NOTES:

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

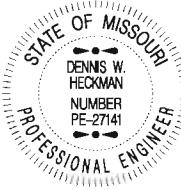
**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c$  = 4,000 PSI  
REINFORCING STEEL (GRADE 60)  $f_y$  = 60,000 PSI

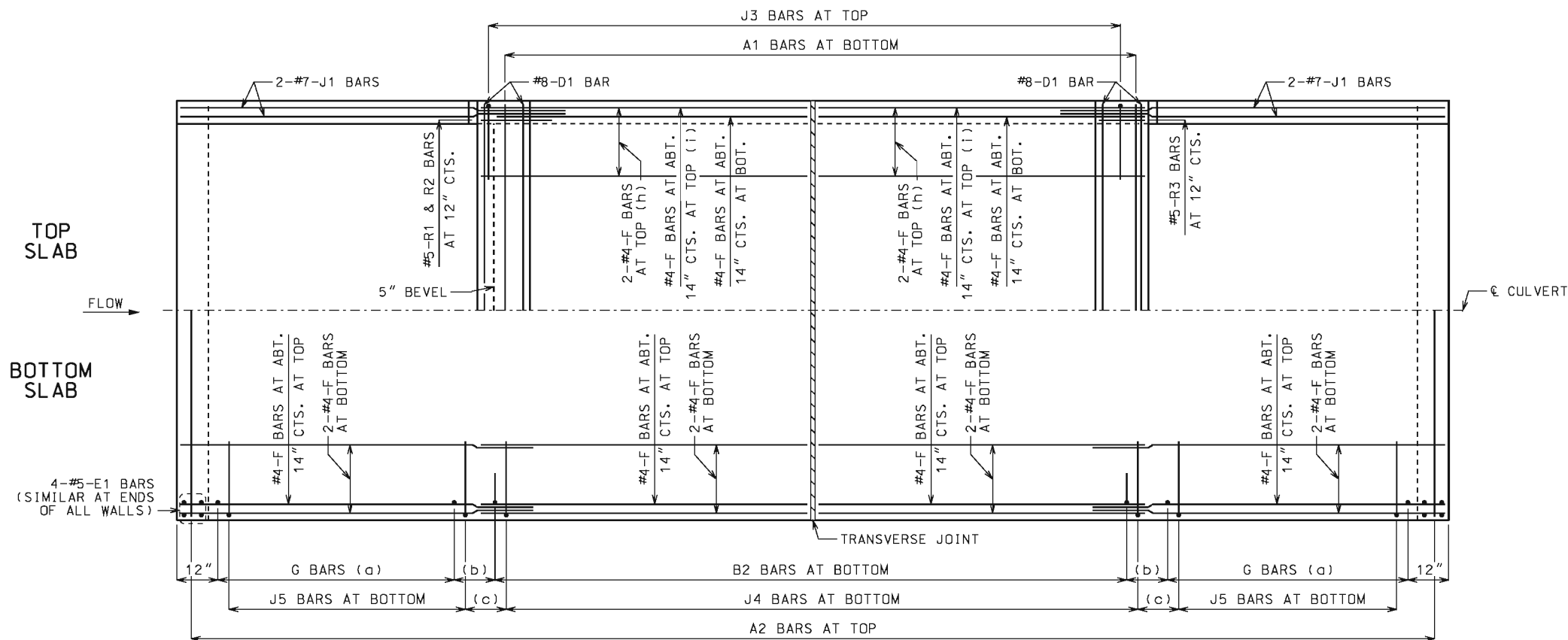
**MISCELLANEOUS:**  
FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS, SEE SHEET 3 OF 3. FOR MEMBER THICKNESS, SEE 703.17.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

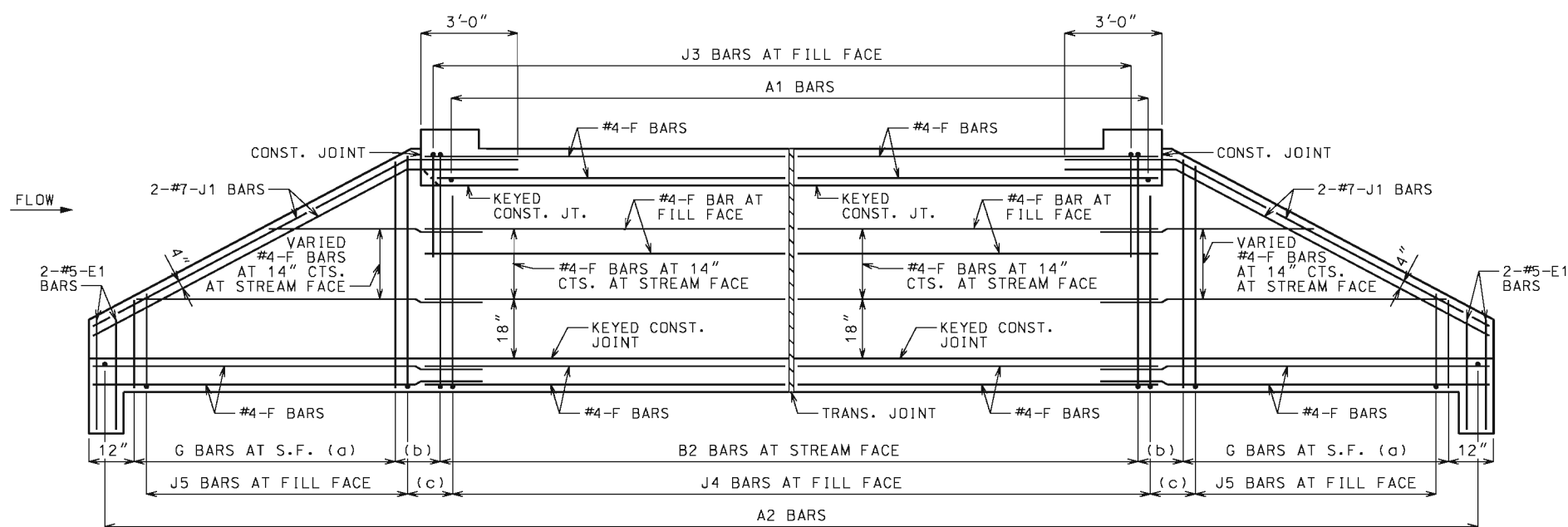
WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST SECTIONS MEASURED ALONG THE SHORTEST WALL SHALL BE 3 FEET. REINFORCEMENT AND DIMENSIONS FOR WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS.

|                                                                                                                                                                                                                                  |                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                              |
| <br>THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY.                                                                      | <b>CONCRETE<br/>SINGLE BOX CULVERT</b><br><br>SKEW: SQUARED<br>WINGS: STRAIGHT<br><br>LAYOUT |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: <u>07/01/2015</u><br>DATE PREPARED: <u>5/13/2015</u>                         |
| <b>703.10J</b>                                                                                                                                                                                                                   |                                                                                              |
| SHEET NO.<br>1 OF 3                                                                                                                                                                                                              |                                                                                              |



### HALF PLANS

HALF PLANS ARE SYMMETRICAL ABOUT  $\phi$  CULVERT.



### ELEVATION

J1 BARS MAY BE BENT IN FIELD OR SHOP.

### LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON ROADWAY OR BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.16.

### GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS B2 BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) NOT SPECIFIED ON THIS SHEET

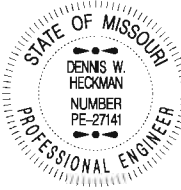
(e) NOT SPECIFIED ON THIS SHEET

(f) NOT SPECIFIED ON THIS SHEET

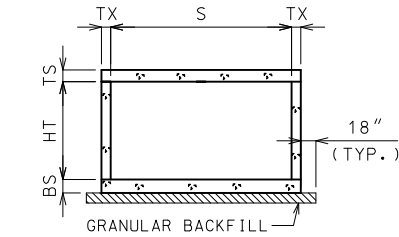
(g) NOT SPECIFIED ON THIS SHEET

(h) FOR DESIGN FILLS OVER 2'-0"

(i) FOR DESIGN FILLS 2'-0" OR LESS

|                                                                                                                                                                                                                                  |                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                            |
|                                                                                                                                             | <b>CONCRETE<br/>SINGLE BOX CULVERT</b><br><br>SKEW: SQUARED<br>WINGS: STRAIGHT<br><br><b>REINFORCEMENT</b> |
| DATE EFFECTIVE: <u>07/01/2015</u><br>DATE PREPARED: <u>5/13/2015</u>                                                                                                                                                             | <b>703.10J</b>                                                                                             |
| SHEET NO.<br><b>2 OF 3</b>                                                                                                                                                                                                       |                                                                                                            |





5/16" PREFORMED FIBER  
EXPANSION JOINT MATERIAL

5/16"

FILTER CLOTH

1/2" (Typ.)

1/2" (Typ.)

EXPOSED SURFACE

PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.

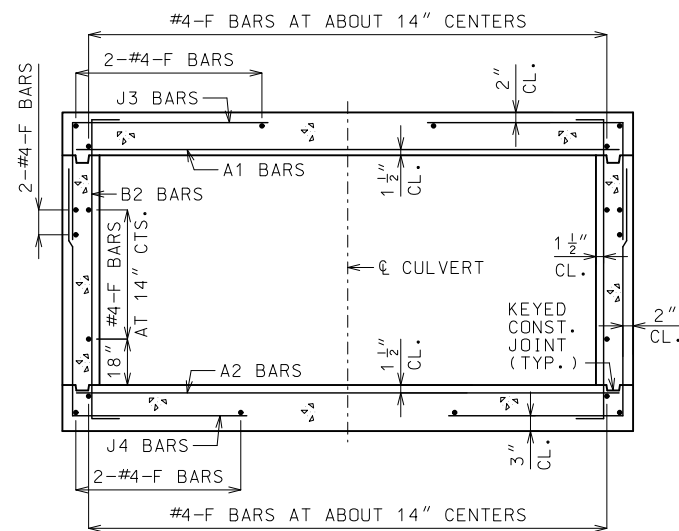
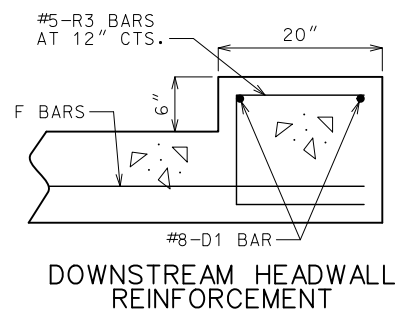
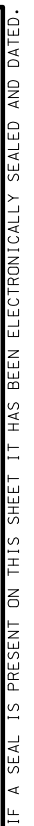
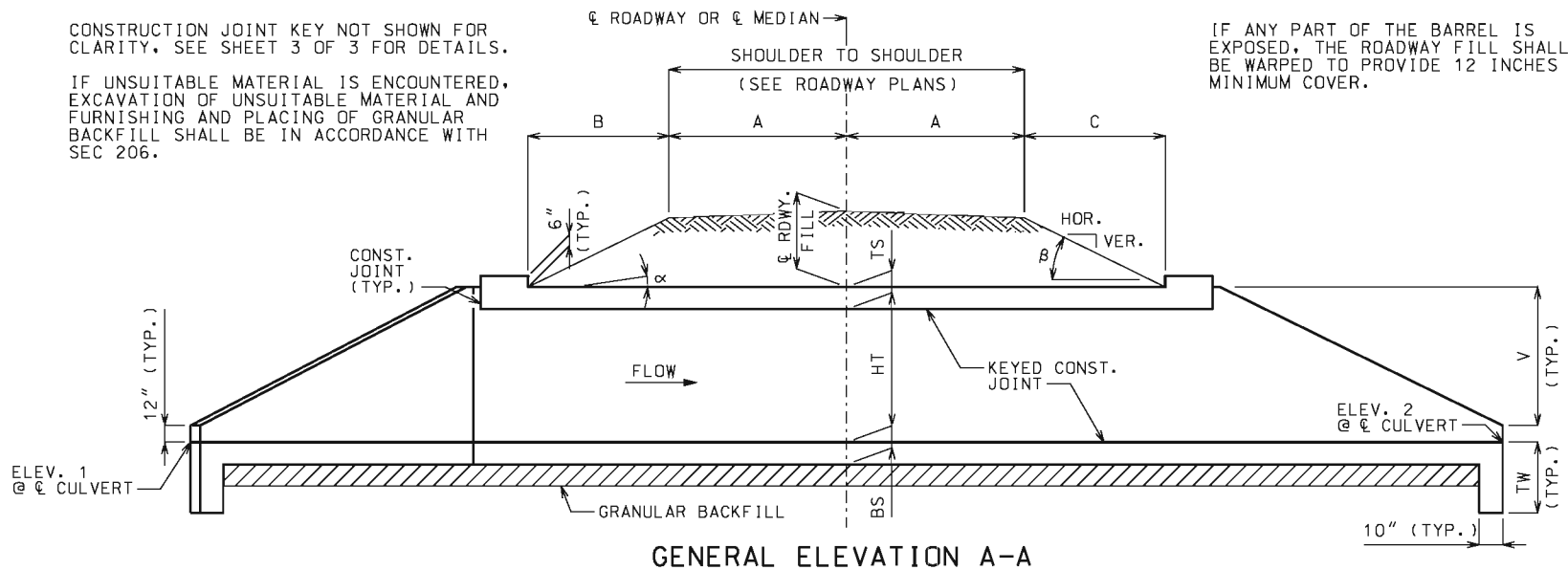


Figure 10 is a detailed reinforcement plan for a 12' x 12' box culvert. The diagram shows a rectangular culvert with a central 'CULVERT' opening. Reinforcement bars are labeled A1, A2, B1, B2, J1, J2, J3, and J4. Dimensions include 18 inches for the top and bottom reinforcement width, 14 inches for the side reinforcement width, and 14 inches for the center-to-center spacing of the reinforcement bars. A keyway is shown on the right side of the culvert.

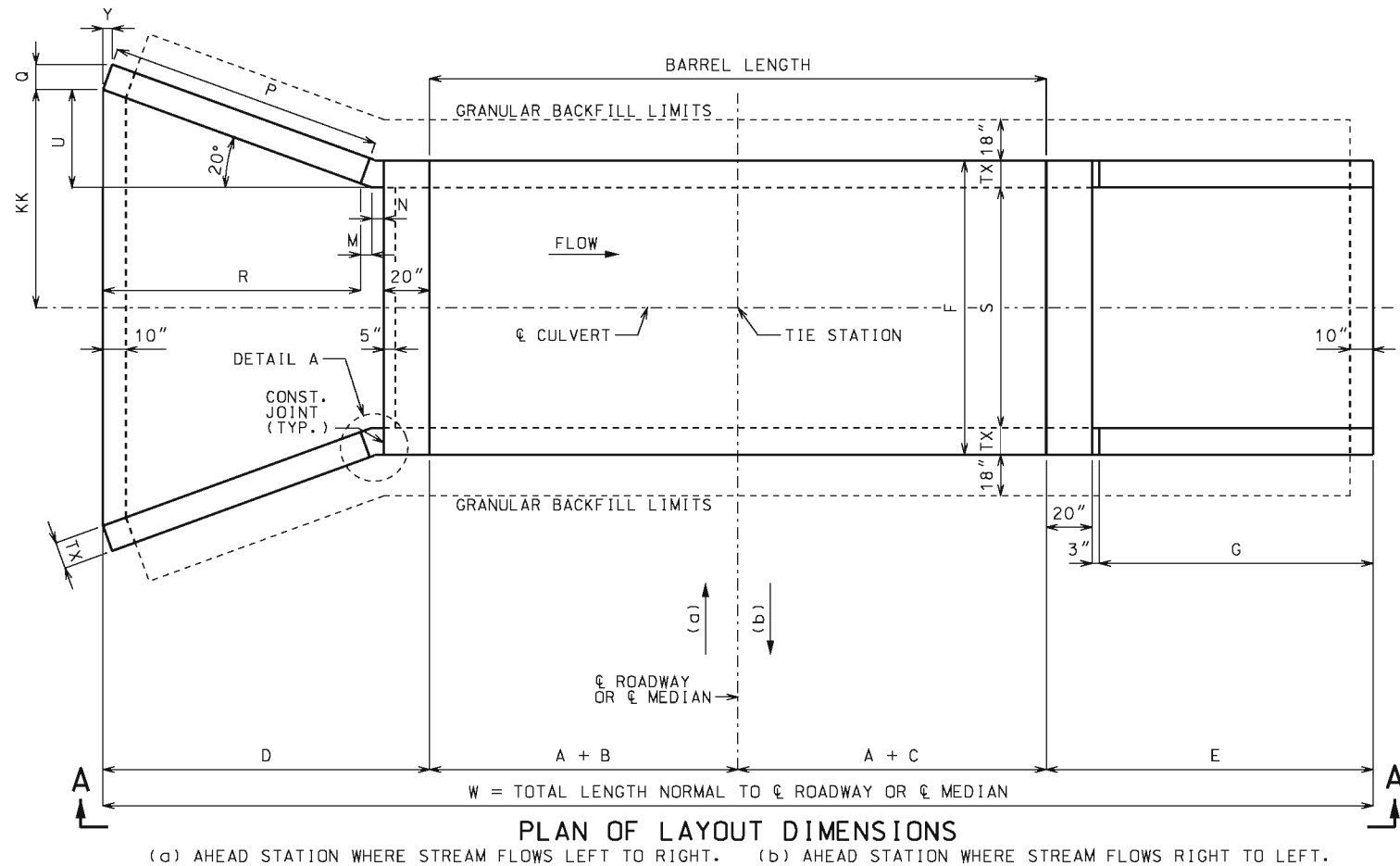
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".





CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.



### EQUATIONS FOR COMPUTING $\alpha$ , $\beta$ , B AND C

$\alpha$  = ANGLE OF BARREL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN} \left( \frac{\text{ELEV. 1} - \text{ELEV. 2}}{W} \right)$

$\beta$  = ANGLE OF FILL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN} \left( \frac{\text{VER.}}{\text{HOR.}} \right)$

B = HORIZONTAL DISTANCE FROM UPSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL + A(CS) - A(TAN $\alpha$ )  
UPSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN

C = HORIZONTAL DISTANCE FROM DOWNSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL + A(CS) + A(TAN $\alpha$ )  
DOWNSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN

CS = CROSS SLOPE OF EACH PART OF ROADWAY INCLUDING CROWN, LANES AND SHOULDERS. CS IS POSITIVE IF RISING AND NEGATIVE IF FALLING AWAY FROM  $\phi$  ROADWAY OR  $\phi$  MEDIAN.

THE TERM "A(CS)" IS THE DIFFERENCE IN ELEVATION BETWEEN  $\phi$  ROADWAY OR  $\phi$  MEDIAN AND THE TOP OF THE FILL SLOPE NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN. THIS TERM SHALL BE ADJUSTED FOR UNSYMMETRICAL AND NONSTANDARD ROADWAYS.

TO ACCOUNT FOR A VARYING PROFILE GRADE THE  $\phi$  ROADWAY FILL SHALL BE BASED ON STATIONS THAT CORRESPOND TO THE CORNERS OF THE INSIDE FACE OF THE HEADWALLS THAT PRODUCE MAXIMUM VALUES FOR B AND C.

SEE ROADWAY PLANS FOR SLOPES,  $\phi$  ROADWAY FILL AND ELEVATIONS 1 AND 2. ELEVATIONS 1 AND 2 CORRESPOND TO UPPER AND LOWER FLOW LINE ELEVATIONS AND MAY BE BELOW THE NATURAL STREAM BOTTOM DUE TO ENVIRONMENTAL REQUIREMENTS.

### LAYOUT DIMENSIONS

| VARIABLE | DIMENSION        | VARIABLE | DIMENSION                |
|----------|------------------|----------|--------------------------|
| $\alpha$ | SEE EQUATIONS    | P        | 2V(SEC 20°)              |
| $\beta$  | SEE EQUATIONS    | Q        | TX(COS 20°)              |
| B        | SEE EQUATIONS    | R        | P(COS 20°)               |
| C        | SEE EQUATIONS    | U        | (R + M)(TAN 20°)         |
| D        | R + M + N + 20"  | V        | HT + TS - 12"            |
| E        | G + 23"          | W        | 2A + B + C + D + E       |
| F        | S + 2TX          | Y        | TX(SIN 20°)              |
| G        | 2V               | KK       | S/2 + U                  |
| M        | N(COS 20°)       | TW       | MAX{3'-4" OR (BS + 12")} |
| N        | 3" + TX(TAN 10°) |          |                          |

### GENERAL NOTES:

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c$  = 4,000 PSI  
REINFORCING STEEL (GRADE 60)  $f_y$  = 60,000 PSI

**MISCELLANEOUS:**  
FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS, SEE SHEET 3 OF 3. FOR MEMBER THICKNESS, SEE 703.17.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

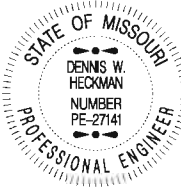
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST SECTIONS MEASURED ALONG THE SHORTEST WALL SHALL BE 3 FEET. REINFORCEMENT AND DIMENSIONS FOR WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**CONCRETE SINGLE BOX CULVERT**

SKEW: SQUARED  
WINGS: FLARED

LAYOUT

DATE EFFECTIVE: 07/01/2015  
DATE PREPARED: 5/13/2015

**703.11J**

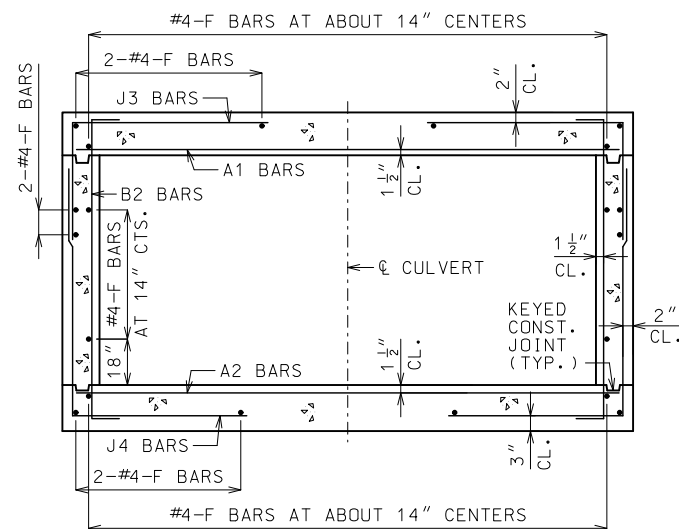
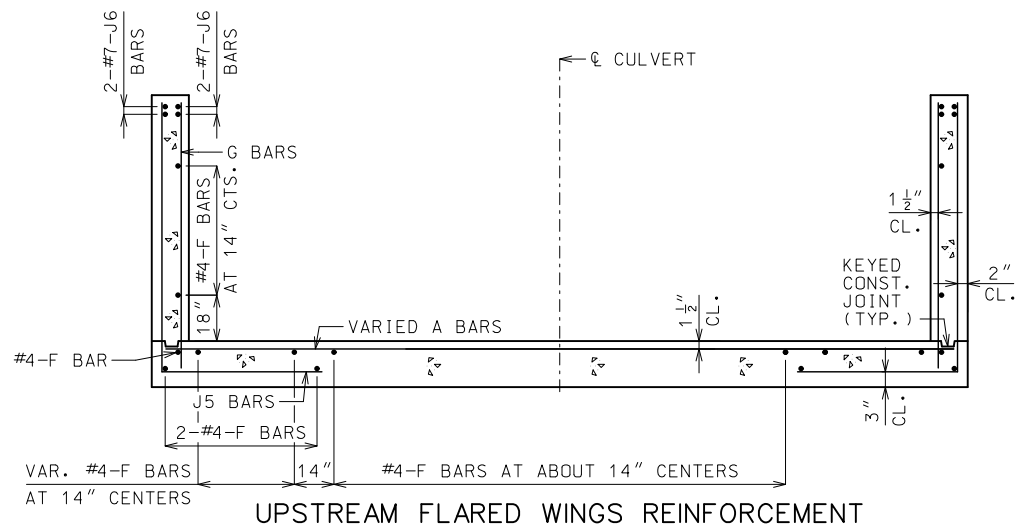
SHEET NO.  
1 OF 3



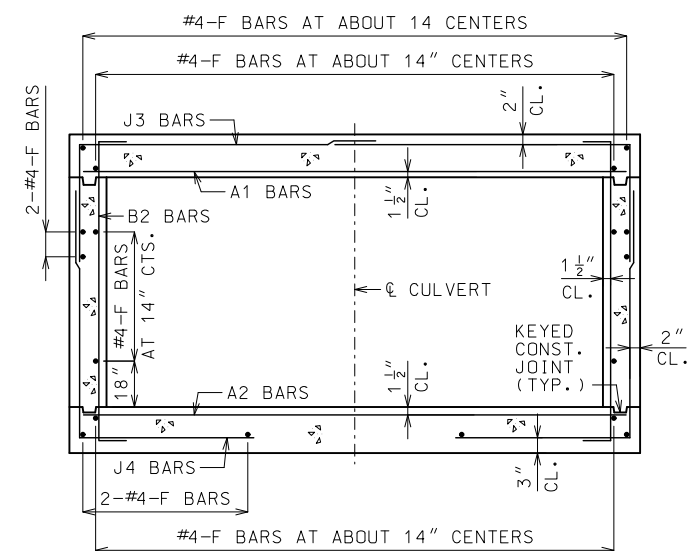
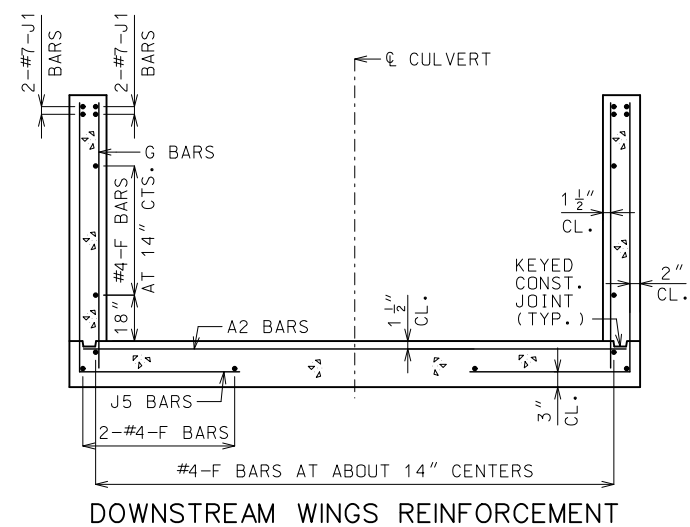


PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

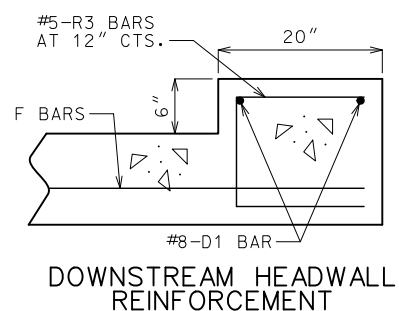
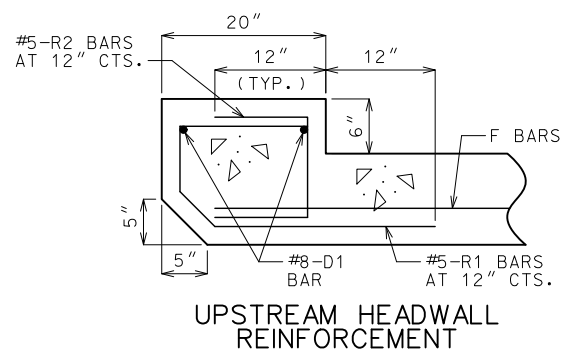
FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



BARREL REINFORCEMENT  
FOR DESIGN FILLS OVER 2'-0"



BARREL REINFORCEMENT  
FOR DESIGN FILLS 2'-0" OR LESS



GENERAL NOTES:

FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW  
DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".



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JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



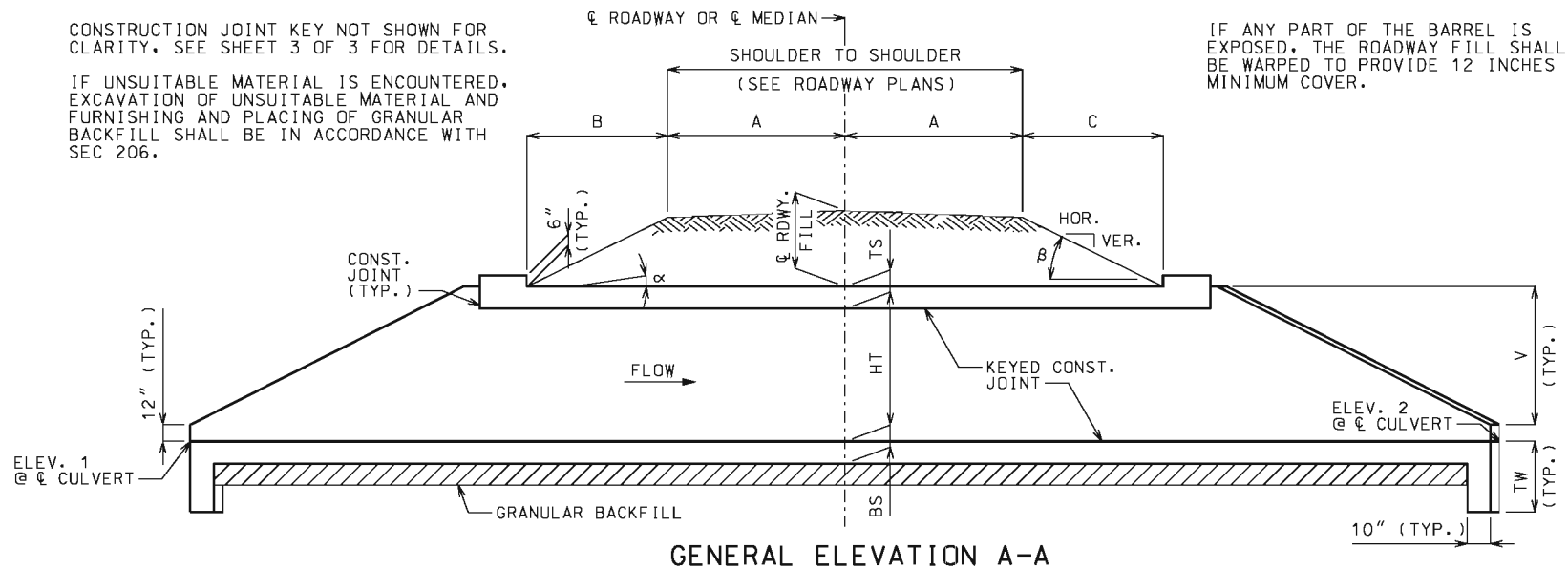
SKREW: SQUARED  
WINGS: FLARED

## SECTIONS

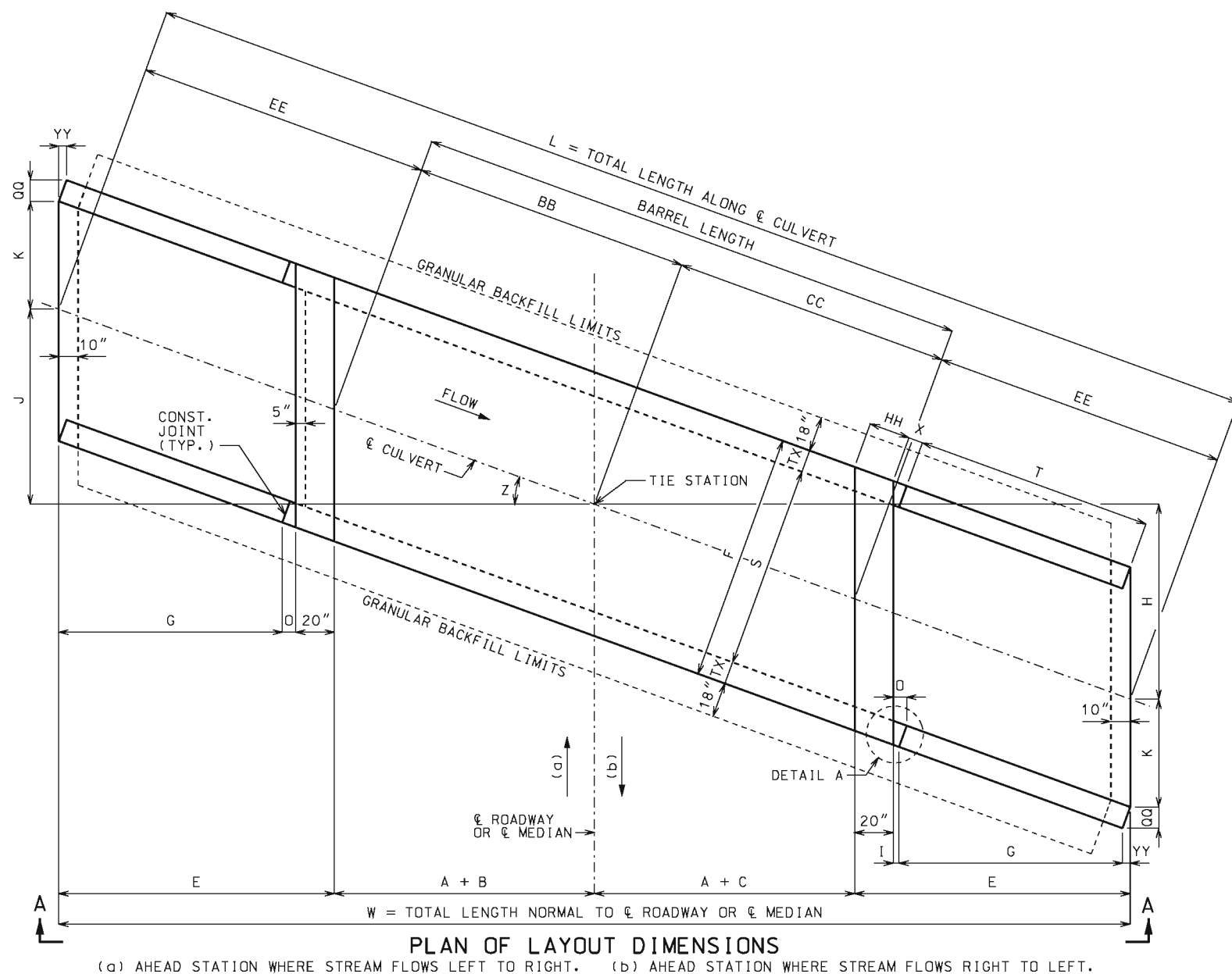
DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

703.11J

SHEET NO.  
3 OF 3



CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.



### EQUATIONS FOR COMPUTING $\alpha$ , $\beta$ , B AND C

$\alpha$  = ANGLE OF BARREL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN}\left(\frac{\text{ELEV. 1} - \text{ELEV. 2}}{W}\right)$

$\beta$  = ANGLE OF FILL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN}\left(\frac{\text{VER.}}{\text{HOR.}}\right)$

B = HORIZONTAL DISTANCE FROM UPSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL +  $A(\text{CS}) - A(\text{TAN}\alpha)$   
UPSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN  
 $\text{TAN}\beta + \text{TAN}\alpha$

C = HORIZONTAL DISTANCE FROM DOWNSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL +  $A(\text{CS}) + A(\text{TAN}\alpha)$   
DOWNSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN  
 $\text{TAN}\beta - \text{TAN}\alpha$

CS = CROSS SLOPE OF EACH PART OF ROADWAY INCLUDING CROWN, LANES AND SHOULDERS. CS IS POSITIVE IF RISING AND NEGATIVE IF FALLING AWAY FROM  $\phi$  ROADWAY OR  $\phi$  MEDIAN.

THE TERM " $A(\text{CS})$ " IS THE DIFFERENCE IN ELEVATION BETWEEN  $\phi$  ROADWAY OR  $\phi$  MEDIAN AND THE TOP OF THE FILL SLOPE NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN. THIS TERM SHALL BE ADJUSTED FOR UNSYMMETRICAL AND NONSTANDARD ROADWAYS.

TO ACCOUNT FOR A VARYING PROFILE GRADE THE  $\phi$  ROADWAY FILL SHALL BE BASED ON STATIONS THAT CORRESPOND TO THE CORNERS OF THE INSIDE FACE OF THE HEADWALLS THAT PRODUCE MAXIMUM VALUES FOR B AND C.

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### LAYOUT DIMENSIONS

| VARIABLE | DIMENSION          | VARIABLE | DIMENSION                |
|----------|--------------------|----------|--------------------------|
| $\alpha$ | SEE EQUATIONS      | T        | G(SEC Z)                 |
| $\beta$  | SEE EQUATIONS      | V        | HT + TS - 12"            |
| B        | SEE EQUATIONS      | W        | 2A + B + C + 2E          |
| C        | SEE EQUATIONS      | X        | 3" + TX(TAN Z)           |
| E        | G + O + 20"        | Z        | SKEW ANGLE               |
| F        | S + 2TX            | BB       | (A + B)(SEC Z)           |
| G        | 2V                 | CC       | (A + C)(SEC Z)           |
| H        | (A + C + E)(TAN Z) | EE       | E(SEC Z)                 |
| I        | 3"(COS Z)          | HH       | 20"(SEC Z)               |
| J        | (A + B + E)(TAN Z) | QO       | TX(COS Z)                |
| K        | S(SEC Z)/2         | YY       | TX(SIN Z)                |
| L        | 2EE + BB + CC      | TW       | MAX{3'-4" OR (BS + 12")} |
| O        | I + YY             |          |                          |

### GENERAL NOTES:

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD. EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c$  = 4,000 PSI  
REINFORCING STEEL (GRADE 60)  $f_y$  = 60,000 PSI

**MISCELLANEOUS:**  
FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS, SEE SHEET 3 OF 3. FOR MEMBER THICKNESS, SEE 703.17.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

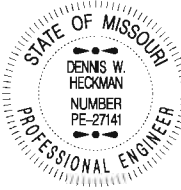
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**CONCRETE SINGLE BOX CULVERT**

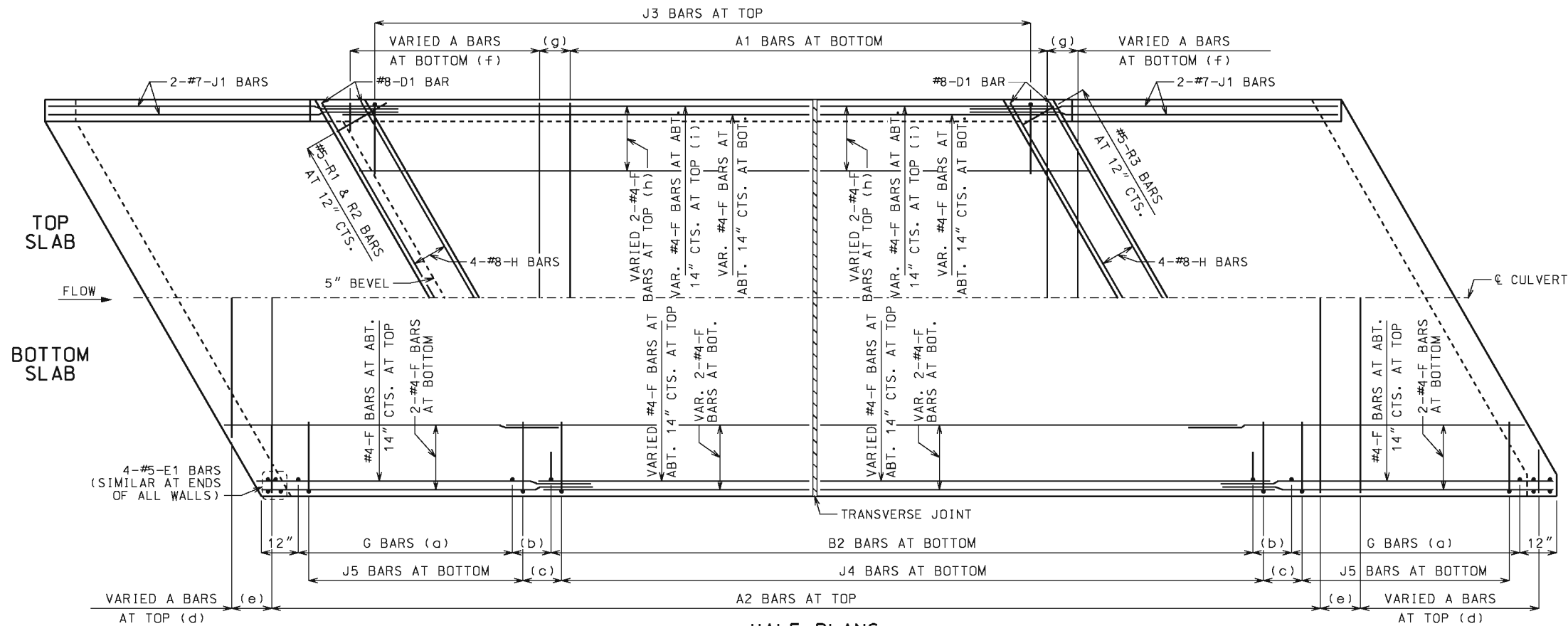
SKEW: LEFT ADVANCE  
WINGS: STRAIGHT

LAYOUT

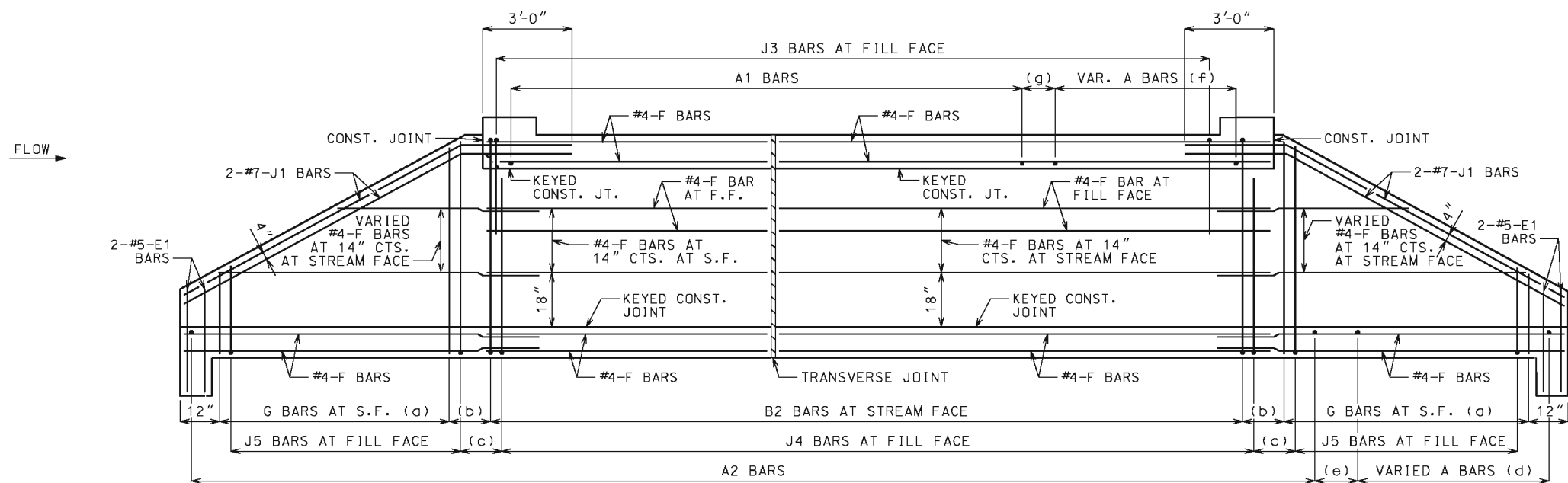
DATE EFFECTIVE: 07/01/2015  
DATE PREPARED: 5/13/2015

**703.12J**

SHEET NO.  
1 OF 3



**HALF PLANS**  
HALF PLANS ARE SYMMETRICAL ABOUT  $\phi$  CULVERT.



**ELEVATION**  
J1 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON ROADWAY OR BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.16.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS B2 BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

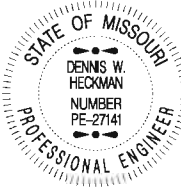
(e) A2 BAR SPACING

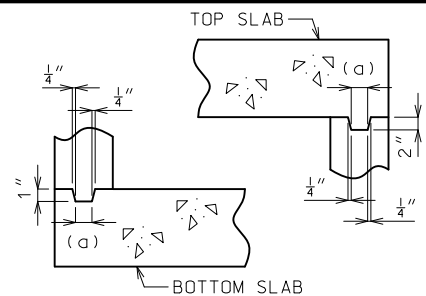
(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING

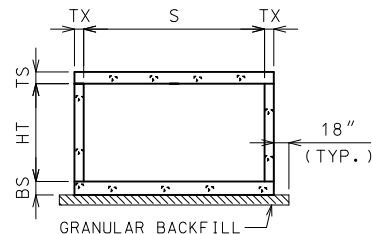
(h) FOR DESIGN FILLS OVER 2'-0"

(i) FOR DESIGN FILLS 2'-0" OR LESS

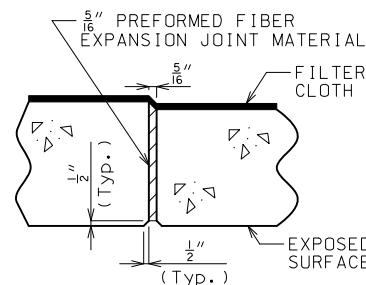
|                                                                                                                                                                                                                                  |                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                                 |
|                                                                                                                                             | <b>CONCRETE<br/>SINGLE BOX CULVERT</b><br><br>SKEW: LEFT ADVANCE<br>WINGS: STRAIGHT<br><br><b>REINFORCEMENT</b> |
| DATE EFFECTIVE: <u>07/01/2015</u><br>DATE PREPARED: <u>5/13/2015</u>                                                                                                                                                             | <b>703.12J</b>                                                                                                  |
| SHEET NO.<br><b>2 OF 3</b>                                                                                                                                                                                                       |                                                                                                                 |



**KEYED CONSTRUCTION JOINT**  
(a) APPROXIMATELY ONE-THIRD OF WALL THICKNESS



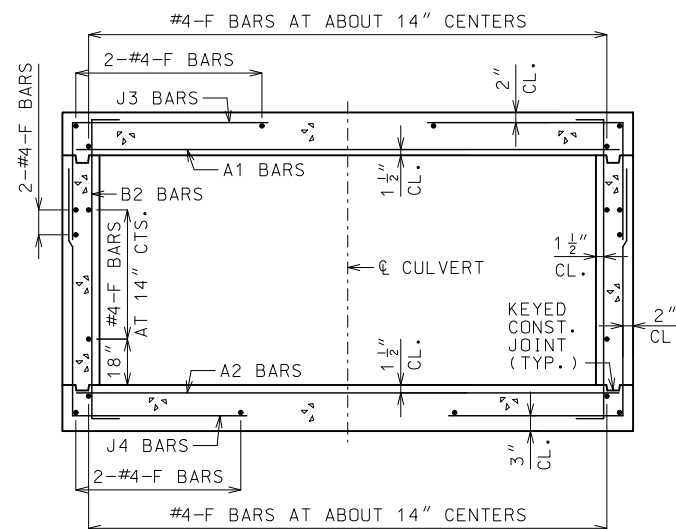
**GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS**



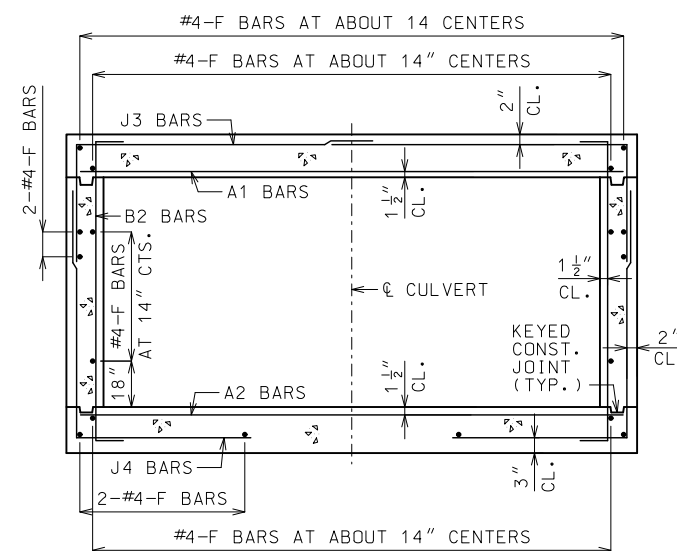
**TRANSVERSE JOINT THRU BARREL**

PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

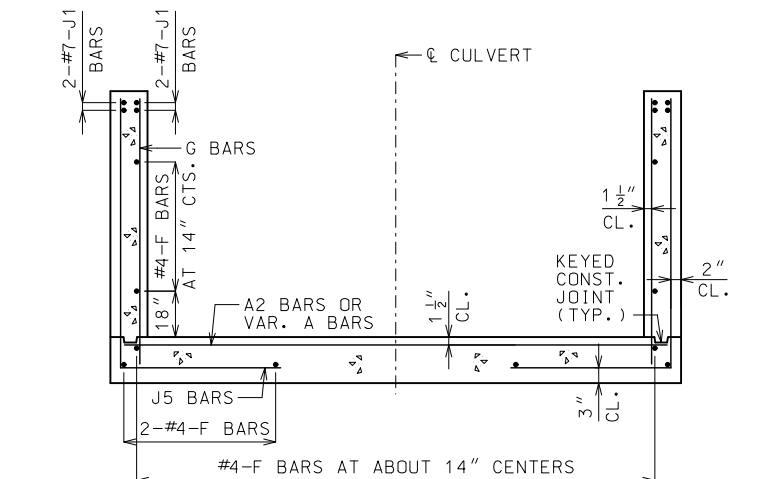
FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



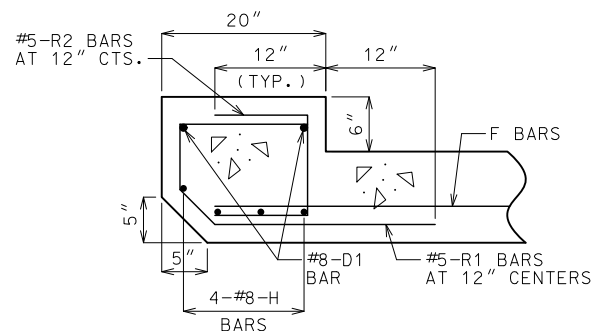
**BARREL REINFORCEMENT**  
FOR DESIGN FILLS OVER 2'-0"



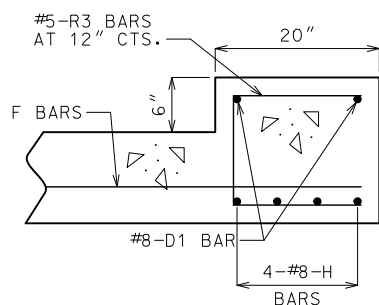
**BARREL REINFORCEMENT**  
FOR DESIGN FILLS 2'-0" OR LESS



**UPSTREAM AND DOWNSTREAM WINGS REINFORCEMENT**



**UPSTREAM HEADWALL REINFORCEMENT**



**DOWNSTREAM HEADWALL REINFORCEMENT**

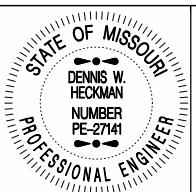
**GENERAL NOTES:**

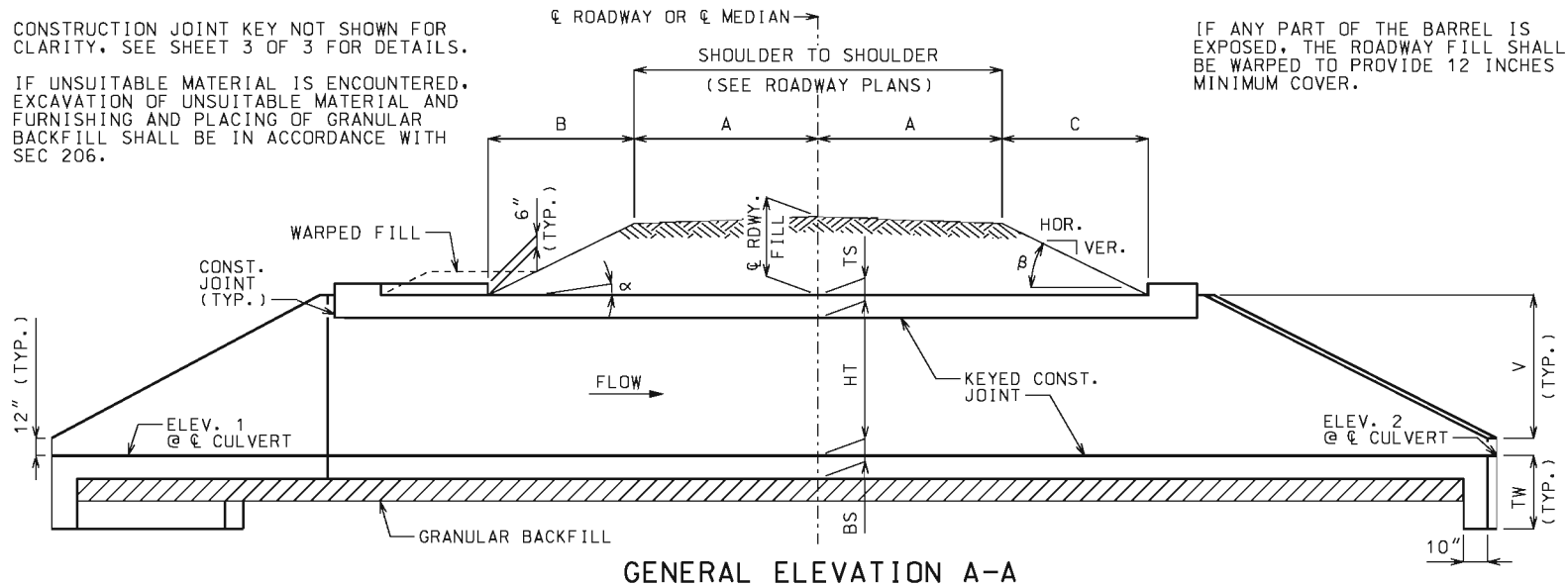
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

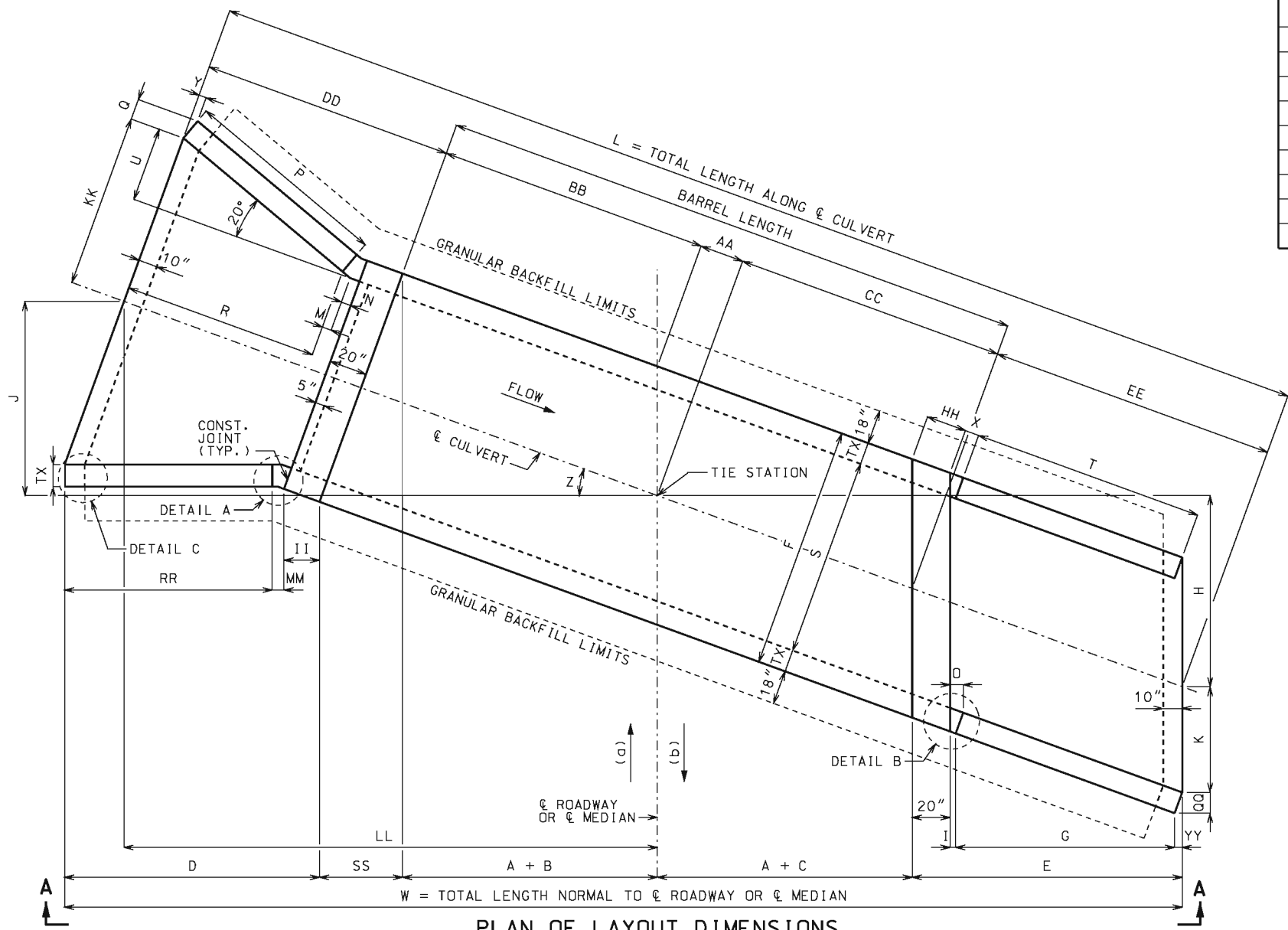
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2 inch.

|                                                                                                                                                                                                                                  |                                                                                                    |                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                    |                            |
|                                                                                                                                             | <b>CONCRETE SINGLE BOX CULVERT</b><br>SKEW: LEFT ADVANCE<br>WINGS: STRAIGHT<br><br><b>SECTIONS</b> |                            |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                          | <b>703.12J</b>                                                                                     | SHEET NO.<br><b>3 OF 3</b> |



GENERAL ELEVATION A-A

CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.



PLAN OF LAYOUT DIMENSIONS

(a) AHEAD STATION WHERE STREAM FLOWS LEFT TO RIGHT. (b) AHEAD STATION WHERE STREAM FLOWS RIGHT TO LEFT.

EQUATIONS FOR COMPUTING  $\alpha$ ,  $\beta$ , B AND C

$\alpha$  = ANGLE OF BARREL SLOPE WITH HORIZONTAL NORMAL TO C ROADWAY OR C MEDIAN =  $\text{ARCTAN} \left( \frac{\text{ELEV. 1} - \text{ELEV. 2}}{\text{LL} + \text{A} + \text{C} + \text{E}} \right)$

$\beta$  = ANGLE OF FILL SLOPE WITH HORIZONTAL NORMAL TO C ROADWAY OR C MEDIAN =  $\text{ARCTAN} \left( \frac{\text{VER.}}{\text{HOR.}} \right)$

B = HORIZONTAL DISTANCE FROM UPSTREAM EDGE OF SHOULDER TO =  $\frac{\text{C RDWY. FILL} + \text{A}(\text{CS}) - \text{A}(\text{TAN} \alpha)}{\text{TAN} \beta + \text{TAN} \alpha}$

C = HORIZONTAL DISTANCE FROM DOWNSTREAM EDGE OF SHOULDER TO =  $\frac{\text{C RDWY. FILL} + \text{A}(\text{CS}) + \text{A}(\text{TAN} \alpha)}{\text{TAN} \beta - \text{TAN} \alpha}$

CS = CROSS SLOPE OF EACH PART OF ROADWAY INCLUDING CROWN, LANES AND SHOULDERS. CS IS POSITIVE IF RISING AND NEGATIVE IF FALLING AWAY FROM C ROADWAY OR C MEDIAN.

THE TERM "A(CS)" IS THE DIFFERENCE IN ELEVATION BETWEEN C ROADWAY OR C MEDIAN AND THE TOP OF THE FILL SLOPE NORMAL TO C ROADWAY OR C MEDIAN. THIS TERM SHALL BE ADJUSTED FOR UNSYMMETRICAL AND NONSTANDARD ROADWAYS.

TO ACCOUNT FOR A VARYING PROFILE GRADE THE C ROADWAY FILL SHALL BE BASED ON STATIONS THAT CORRESPOND TO THE CORNERS OF THE INSIDE FACE OF THE HEADWALLS THAT PRODUCE MAXIMUM VALUES FOR B AND C.

SEE ROADWAY PLANS FOR SLOPES, C ROADWAY FILL AND ELEVATIONS 1 AND 2. ELEVATIONS 1 AND 2 CORRESPOND TO UPPER AND LOWER FLOW LINE ELEVATIONS AND MAY BE BELOW THE NATURAL STREAM BOTTOM DUE TO ENVIRONMENTAL REQUIREMENTS.

LAYOUT DIMENSIONS

| VARIABLE | DIMENSION                  | VARIABLE | DIMENSION               | VARIABLE | DIMENSION                |
|----------|----------------------------|----------|-------------------------|----------|--------------------------|
| $\alpha$ | SEE EQUATIONS              | N        | 3" + TX(TAN 10°)        | CC       | (A + C)(SEC Z)           |
| $\beta$  | SEE EQUATIONS              | O        | I + YY                  | DD       | R + M + N + 20"          |
| B        | SEE EQUATIONS              | P        | 2V[SEC(Z + 20°)]        | EE       | E(SEC Z)                 |
| C        | SEE EQUATIONS              | Q        | TX(COS 20°)             | HH       | 20"(SEC Z)               |
| D        | Z ≥ 20°: II + MM + RR      | R        | P(COS 20°)              | II       | 20"(COS Z)               |
|          | Z < 20°: II + MM + RR + TT | T        | G(SEC Z)                | KK       | S/2 + U                  |
| E        | G + O + 20"                | U        | (R + M)(TAN 20°)        | LL       | (AA + BB + DD)(COS Z)    |
| F        | S + 2TX                    | V        | HT + TS - 12"           | MM       | 3"[COS Z + COS(Z - 20°)] |
| G        | 2V                         | W        | 2A + B + C + D + E + SS | QQ       | TX(COS Z)                |
| H        | (A + C + E)(TAN Z)         | X        | 3" + TX(TAN Z)          | RR       | P[COS(Z - 20°)]          |
| I        | 3"(COS Z)                  | Y        | TX(SIN 20°)             | SS       | F(SIN Z)                 |
| J        | (AA + BB + DD)(SIN Z)      | Z        | SKEW ANGLE              | TT       | TX[SIN(20° - Z)]         |
| K        | S(SEC Z)/2                 | AA       | F(TAN Z)/2              | YY       | TX(SIN Z)                |
| L        | AA + BB + CC + DD + EE     | BB       | (A + B)(SEC Z)          | TW       | MAX{3'-4" OR (BS + 12")} |
| M        | N(COS 20°)                 |          |                         |          |                          |

GENERAL NOTES:

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c$  = 4,000 PSI  
REINFORCING STEEL (GRADE 60)  $f_y$  = 60,000 PSI

**MISCELLANEOUS:**  
FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS, SEE SHEET 3 OF 3. FOR MEMBER THICKNESS, SEE 703.17.

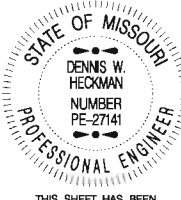
DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.  
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST SECTIONS MEASURED ALONG THE SHORTEST WALL SHALL BE 3 FEET. REINFORCEMENT AND DIMENSIONS FOR WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**CONCRETE SINGLE BOX CULVERT**

SKEW: LEFT ADVANCE  
WINGS: FLARED

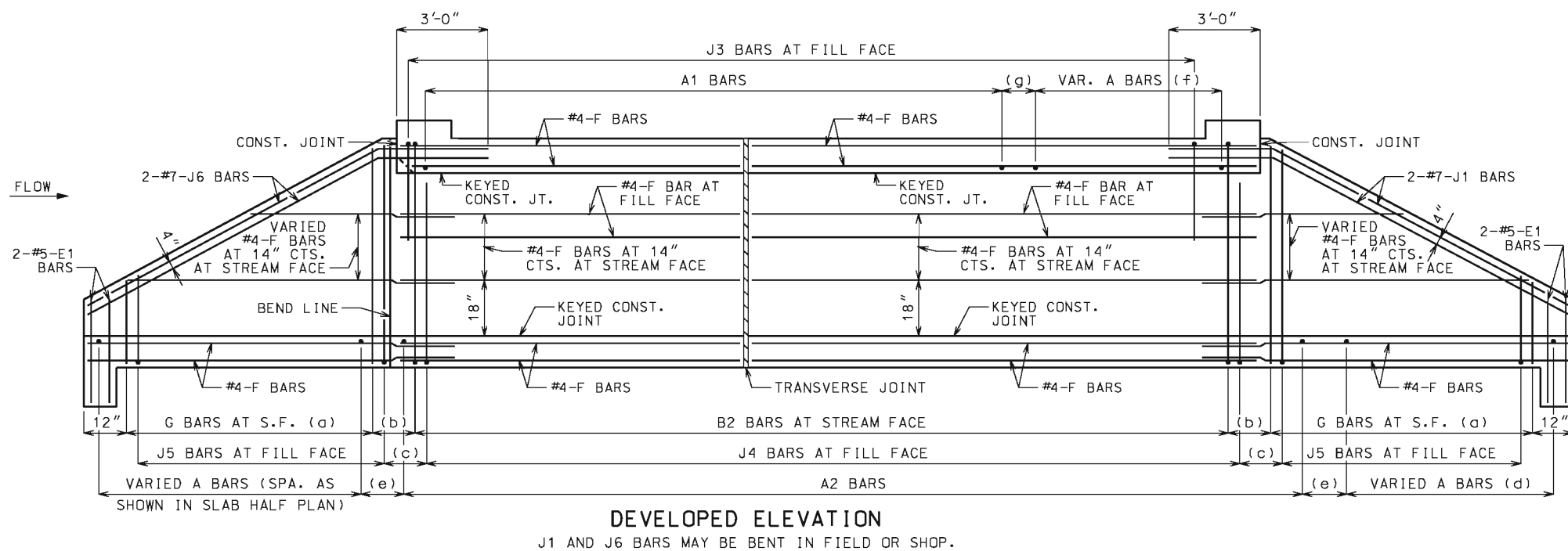
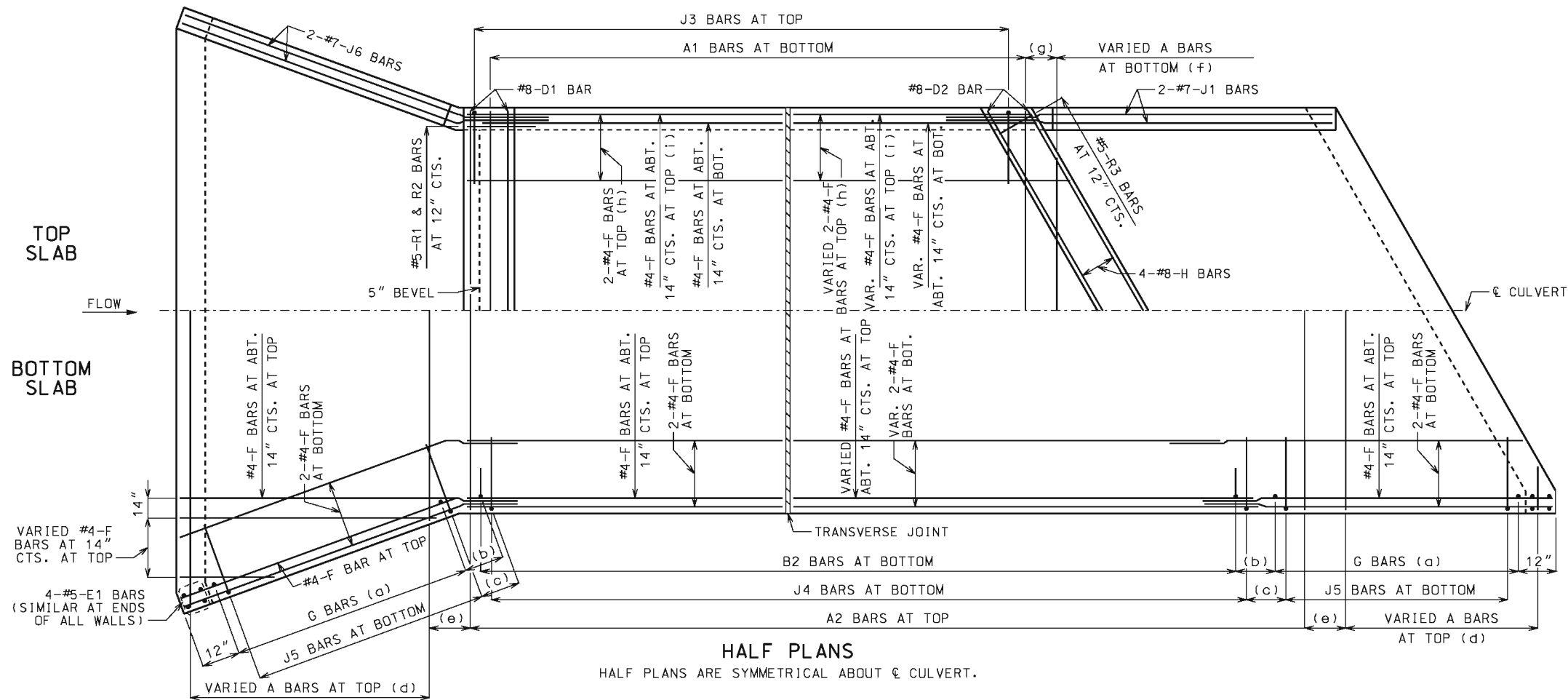
LAYOUT

DATE EFFECTIVE: 07/01/2015  
DATE PREPARED: 5/13/2015

**703.13J**

SHEET NO.  
1 OF 3





## LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON ROADWAY OR BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.16.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1½".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS B2 BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

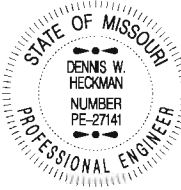
(e) A2 BAR SPACING

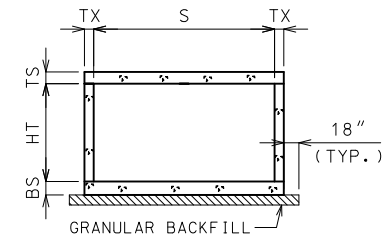
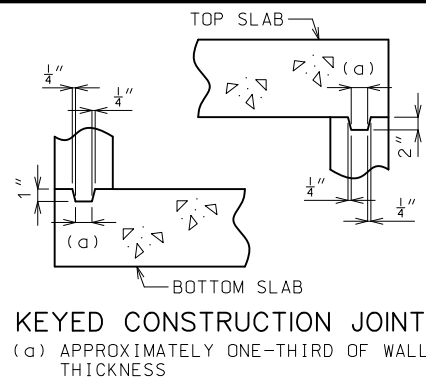
(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING

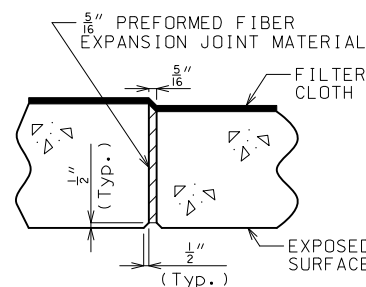
(h) FOR DESIGN FILLS OVER 2'-0"

(i) FOR DESIGN FILLS 2'-0" OR LESS

|                                                                                                                                                                                                                                                                |                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                  |                                                                                                                              |
|  <p>STATE OF MISSOURI<br/>DENNIS W. HECKMAN<br/>NUMBER PE-27141<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p><b>CONCRETE<br/>SINGLE BOX CULVERT</b></p> <p><b>SKEW: LEFT ADVANCE<br/>WINGS: FLARED</b></p> <p><b>REINFORCEMENT</b></p> |
| <p>DATE EFFECTIVE: <u>07/01/2015</u></p> <p>DATE PREPARED: <u>5/13/2015</u></p>                                                                                                                                                                                | <p><b>703.13J</b></p>                                                                                                        |
| <p>SHEET NO.<br/><b>2 OF 3</b></p>                                                                                                                                                                                                                             |                                                                                                                              |



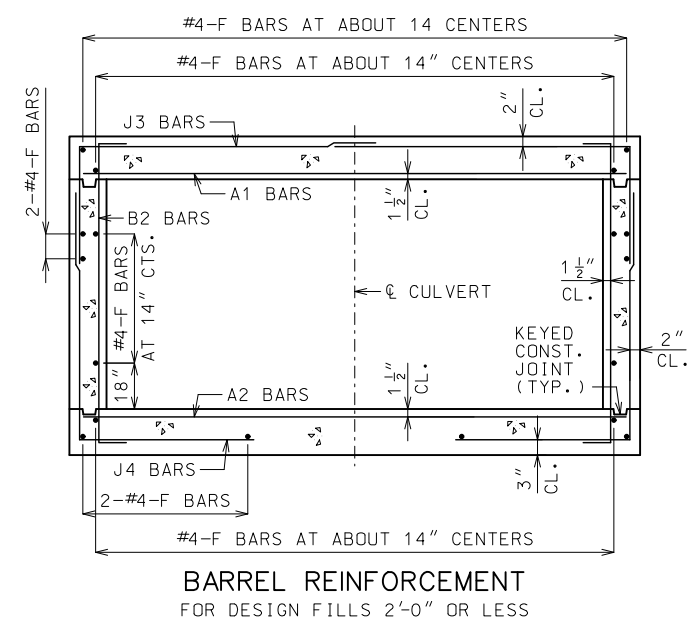
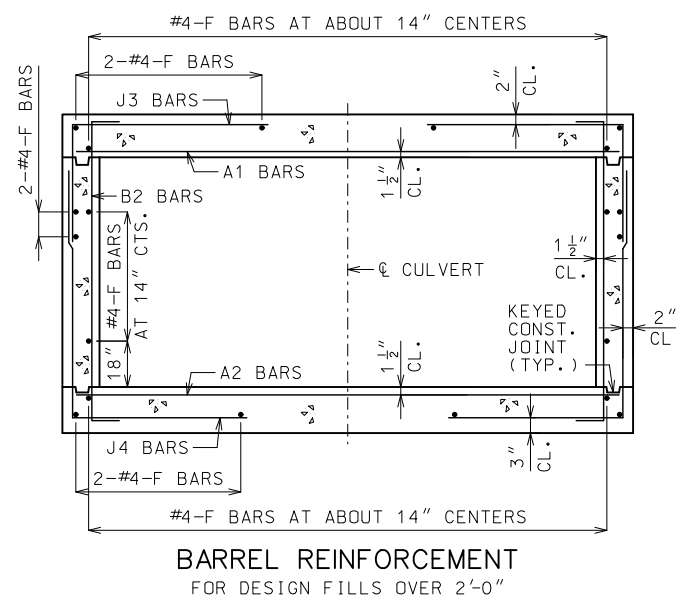
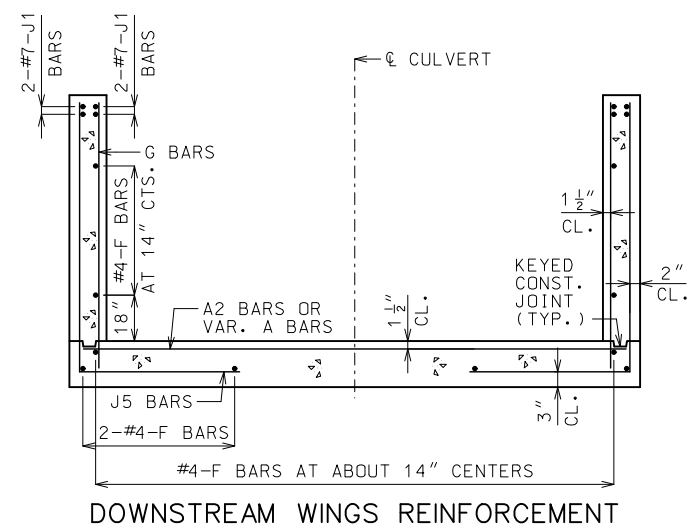
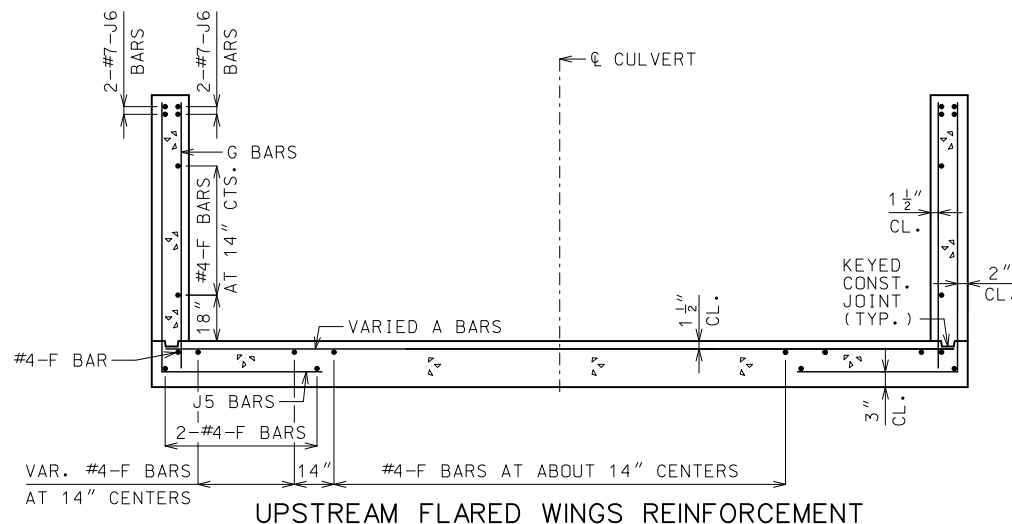
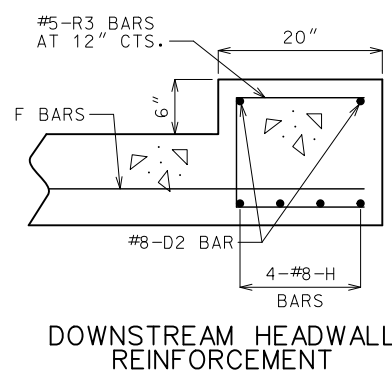
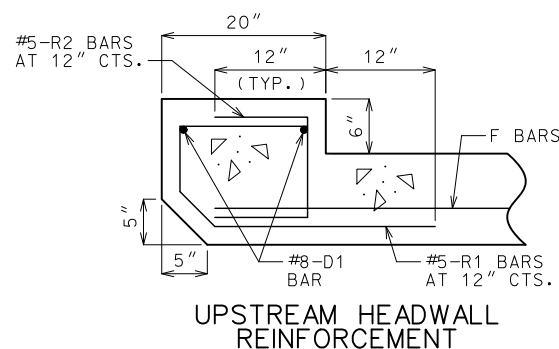
GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS



TRANSVERSE JOINT THRU BARREL

PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



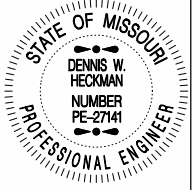
#### GENERAL NOTES:

FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

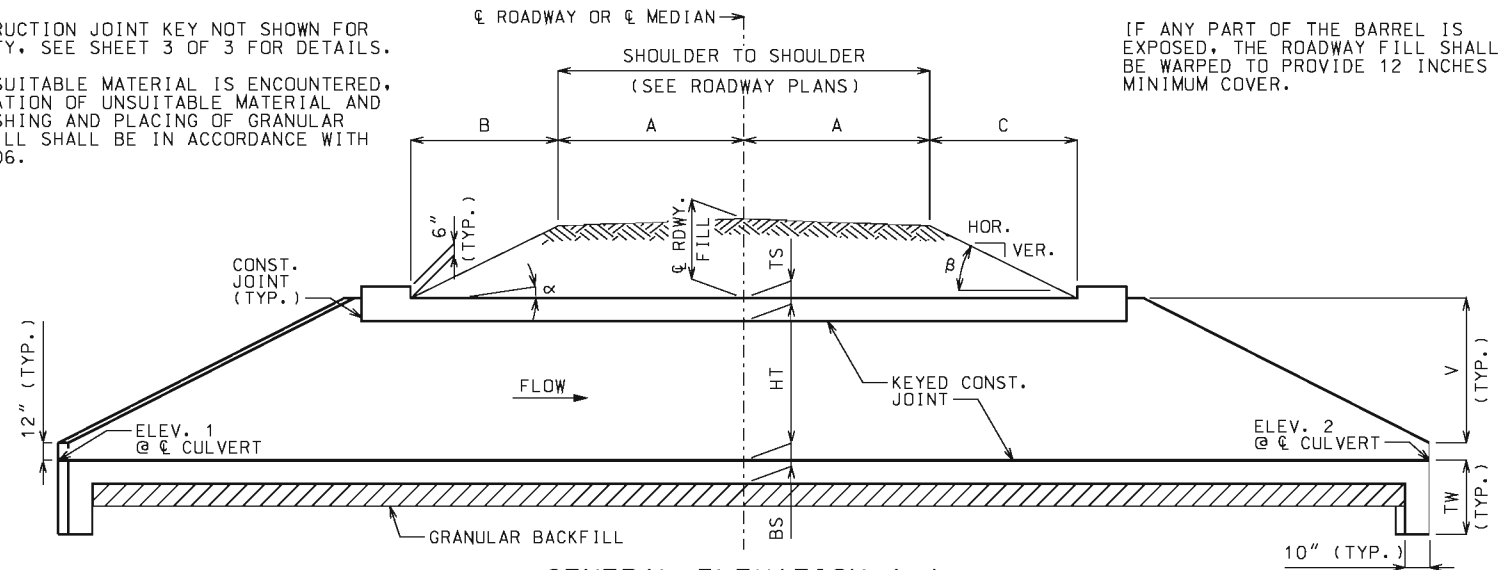
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".

|                                                                                                                                              |                                                                           |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                                                           |                     |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                                                           |                     |
|                                                         | <b>CONCRETE SINGLE BOX CULVERT</b><br>SKEW: LEFT ADVANCE<br>WINGS: FLARED |                     |
| SECTIONS                                                                                                                                     |                                                                           |                     |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                      | <b>703.13J</b>                                                            | SHEET NO.<br>3 OF 3 |

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY. SEE SHEET 3 OF 3 FOR DETAILS.

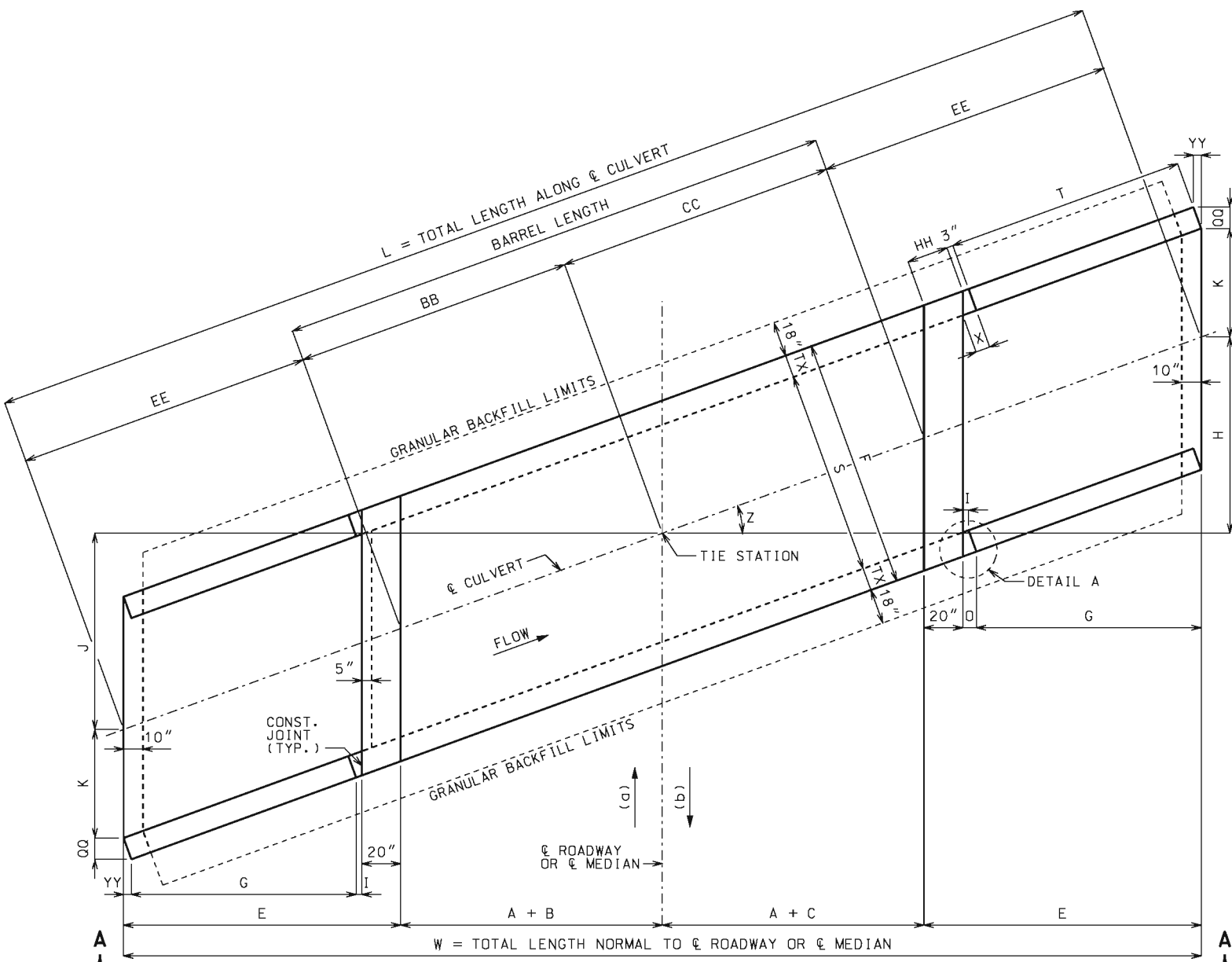
IF UNSUITABLE MATERIAL IS ENCOUNTERED, EXCAVATION OF UNSUITABLE MATERIAL AND FURNISHING AND PLACING OF GRANULAR BACKFILL SHALL BE IN ACCORDANCE WITH SEC 206.

IF ANY PART OF THE BARREL IS EXPOSED, THE ROADWAY FILL SHALL BE WARPED TO PROVIDE 12 INCHES MINIMUM COVER.



GENERAL ELEVATION A-A

CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.



PLAN OF LAYOUT DIMENSIONS

(a) AHEAD STATION WHERE STREAM FLOWS LEFT TO RIGHT. (b) AHEAD STATION WHERE STREAM FLOWS RIGHT TO LEFT.

EQUATIONS FOR COMPUTING  $\alpha$ ,  $\beta$ , B AND C

$\alpha$  = ANGLE OF BARREL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN} \left( \frac{\text{ELEV. 1} - \text{ELEV. 2}}{W} \right)$

$\beta$  = ANGLE OF FILL SLOPE WITH HORIZONTAL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN =  $\text{ARCTAN} \left( \frac{\text{VER.}}{\text{HOR.}} \right)$

B = HORIZONTAL DISTANCE FROM UPSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL +  $A(\text{CS}) - A(\text{TAN} \alpha)$   
UPSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN  
 $\text{TAN} \beta + \text{TAN} \alpha$

C = HORIZONTAL DISTANCE FROM DOWNSTREAM EDGE OF SHOULDER TO =  $\phi$  RDWY. FILL +  $A(\text{CS}) + A(\text{TAN} \alpha)$   
DOWNSTREAM HEADWALL NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN  
 $\text{TAN} \beta - \text{TAN} \alpha$

CS = CROSS SLOPE OF EACH PART OF ROADWAY INCLUDING CROWN, LANES AND SHOULDERS. CS IS POSITIVE IF RISING AND NEGATIVE IF FALLING AWAY FROM  $\phi$  ROADWAY OR  $\phi$  MEDIAN.

THE TERM " $A(\text{CS})$ " IS THE DIFFERENCE IN ELEVATION BETWEEN  $\phi$  ROADWAY OR  $\phi$  MEDIAN AND THE TOP OF THE FILL SLOPE NORMAL TO  $\phi$  ROADWAY OR  $\phi$  MEDIAN. THIS TERM SHALL BE ADJUSTED FOR UNSYMMETRICAL AND NONSTANDARD ROADWAYS.

TO ACCOUNT FOR A VARYING PROFILE GRADE THE  $\phi$  ROADWAY FILL SHALL BE BASED ON STATIONS THAT CORRESPOND TO THE CORNERS OF THE INSIDE FACE OF THE HEADWALLS THAT PRODUCE MAXIMUM VALUES FOR B AND C.

SEE ROADWAY PLANS FOR SLOPES,  $\phi$  ROADWAY FILL AND ELEVATIONS 1 AND 2. ELEVATIONS 1 AND 2 CORRESPOND TO UPPER AND LOWER FLOW LINE ELEVATIONS AND MAY BE BELOW THE NATURAL STREAM BOTTOM DUE TO ENVIRONMENTAL REQUIREMENTS.

LAYOUT DIMENSIONS

| VARIABLE | DIMENSION          | VARIABLE | DIMENSION                |
|----------|--------------------|----------|--------------------------|
| $\alpha$ | SEE EQUATIONS      | T        | G(SEC Z)                 |
| $\beta$  | SEE EQUATIONS      | V        | HT + TS - 12"            |
| B        | SEE EQUATIONS      | W        | 2A + B + C + 2E          |
| C        | SEE EQUATIONS      | X        | 3" + TX(TAN Z)           |
| E        | G + O + 20"        | Z        | SKEW ANGLE               |
| F        | S + 2TX            | BB       | (A + B)(SEC Z)           |
| G        | 2V                 | CC       | (A + C)(SEC Z)           |
| H        | (A + C + E)(TAN Z) | EE       | E(SEC Z)                 |
| I        | 3"(COS Z)          | HH       | 20"(SEC Z)               |
| J        | (A + B + E)(TAN Z) | OO       | TX(COS Z)                |
| K        | S(SEC Z)/2         | YY       | TX(SIN Z)                |
| L        | 2EE + BB + CC      | TW       | MAX{3'-4" OR (BS + 12")} |
| O        | I + YY             |          |                          |

GENERAL NOTES:

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

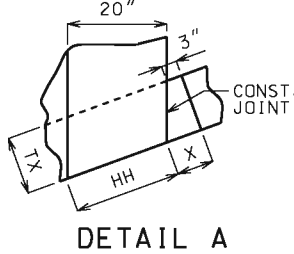
**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c$  = 4,000 PSI  
REINFORCING STEEL (GRADE 60)  $f_y$  = 60,000 PSI

**MISCELLANEOUS:**  
FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS, SEE SHEET 3 OF 3. FOR MEMBER THICKNESS, SEE 703.17.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.  
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST SECTIONS MEASURED ALONG THE SHORTEST WALL SHALL BE 3 FEET. REINFORCEMENT AND DIMENSIONS FOR WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS.

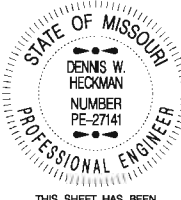


DETAIL A



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**CONCRETE SINGLE BOX CULVERT**

SKEW: RIGHT ADVANCE  
WINGS: STRAIGHT

LAYOUT

DATE EFFECTIVE: 07/01/2015  
DATE PREPARED: 5/13/2015

**703.14J**

SHEET NO.  
1 OF 3

UNLESS SHOWN ON ROADWAY OR BRIDGE PLANS

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE  
SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE  
JOINT.

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.16.



GENERAL NOTES:

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN HALF PLANS AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS B2 BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING

(h) FOR DESIGN FILLS OVER 2'-0"

(i) FOR DESIGN FILLS 2'-0" OR LESS



105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

SKEW: RIGHT ADVANCE  
WINGS: STRAIGHT

## REINFORCEMENT



STATE OF MISSOURI

DENNIS W. HECKMAN  
NUMBER  
PE-27141

PROFESSIONAL ENGINEER

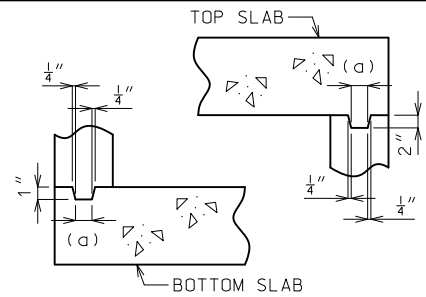
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY

DATE EFFECTIVE: 07/01/2015  
DATE PREPARED: 5/13/2015

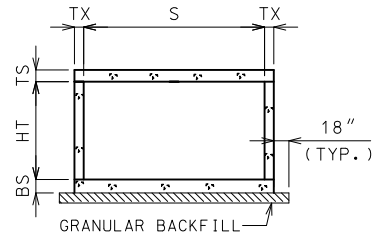
**703.14J**

SHEET NO.  
2 OF 3

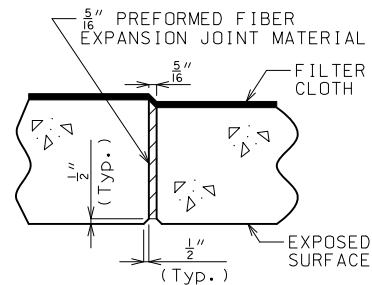
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED:



KEYED CONSTRUCTION JOINT  
(a) APPROXIMATELY ONE-THIRD OF WALL THICKNESS



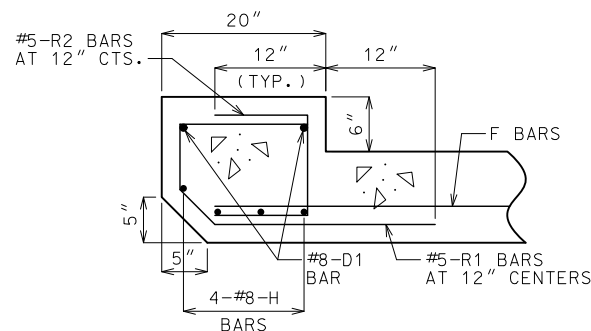
GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS



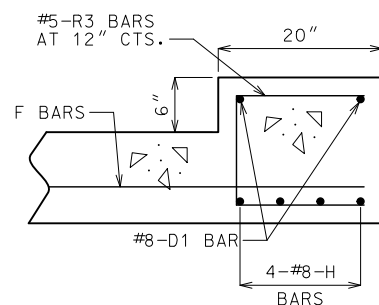
TRANSVERSE JOINT THRU BARREL

PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

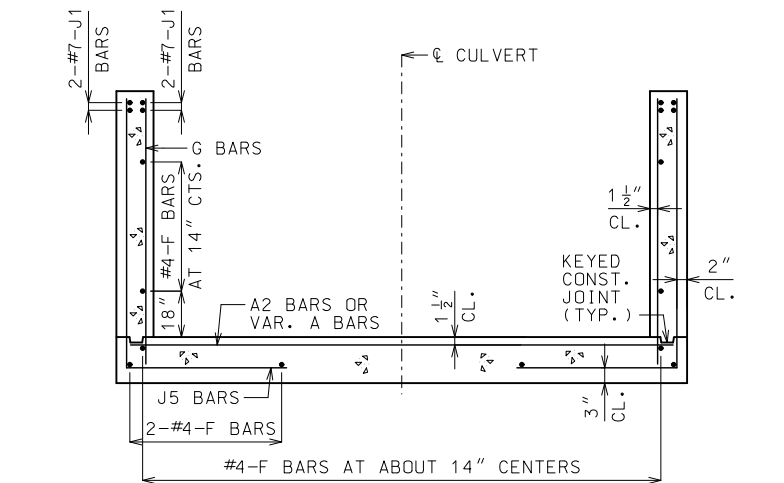
FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



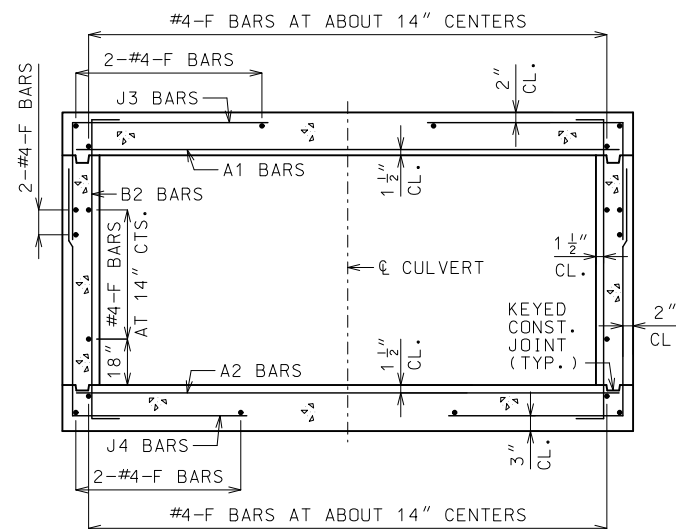
UPSTREAM HEADWALL REINFORCEMENT



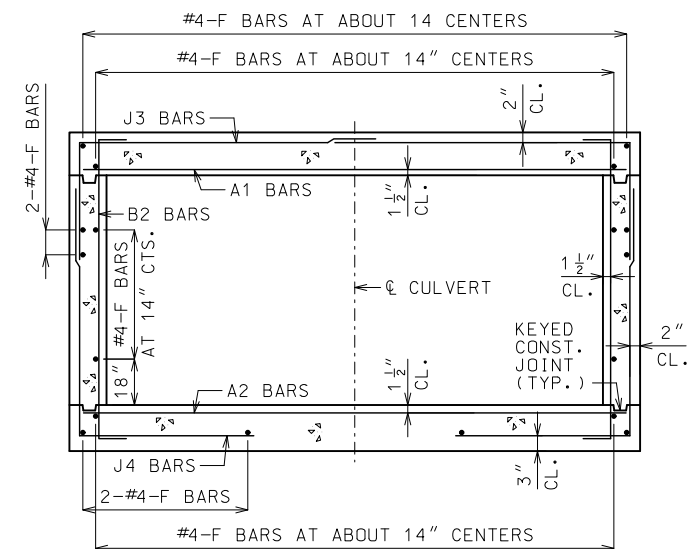
DOWNSTREAM HEADWALL REINFORCEMENT



UPSTREAM AND DOWNSTREAM WINGS REINFORCEMENT



BARREL REINFORCEMENT  
FOR DESIGN FILLS OVER 2'-0"



BARREL REINFORCEMENT  
FOR DESIGN FILLS 2'-0" OR LESS

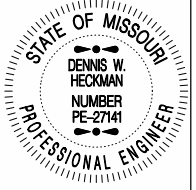
#### GENERAL NOTES:

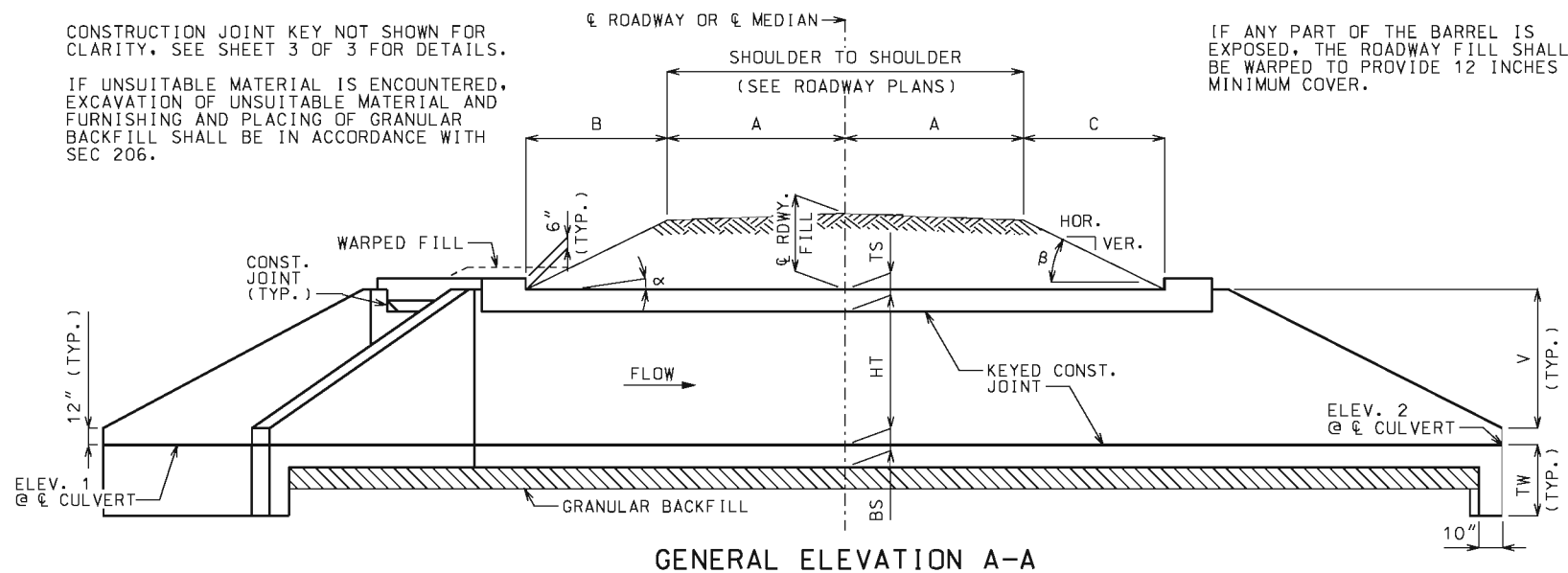
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.17. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

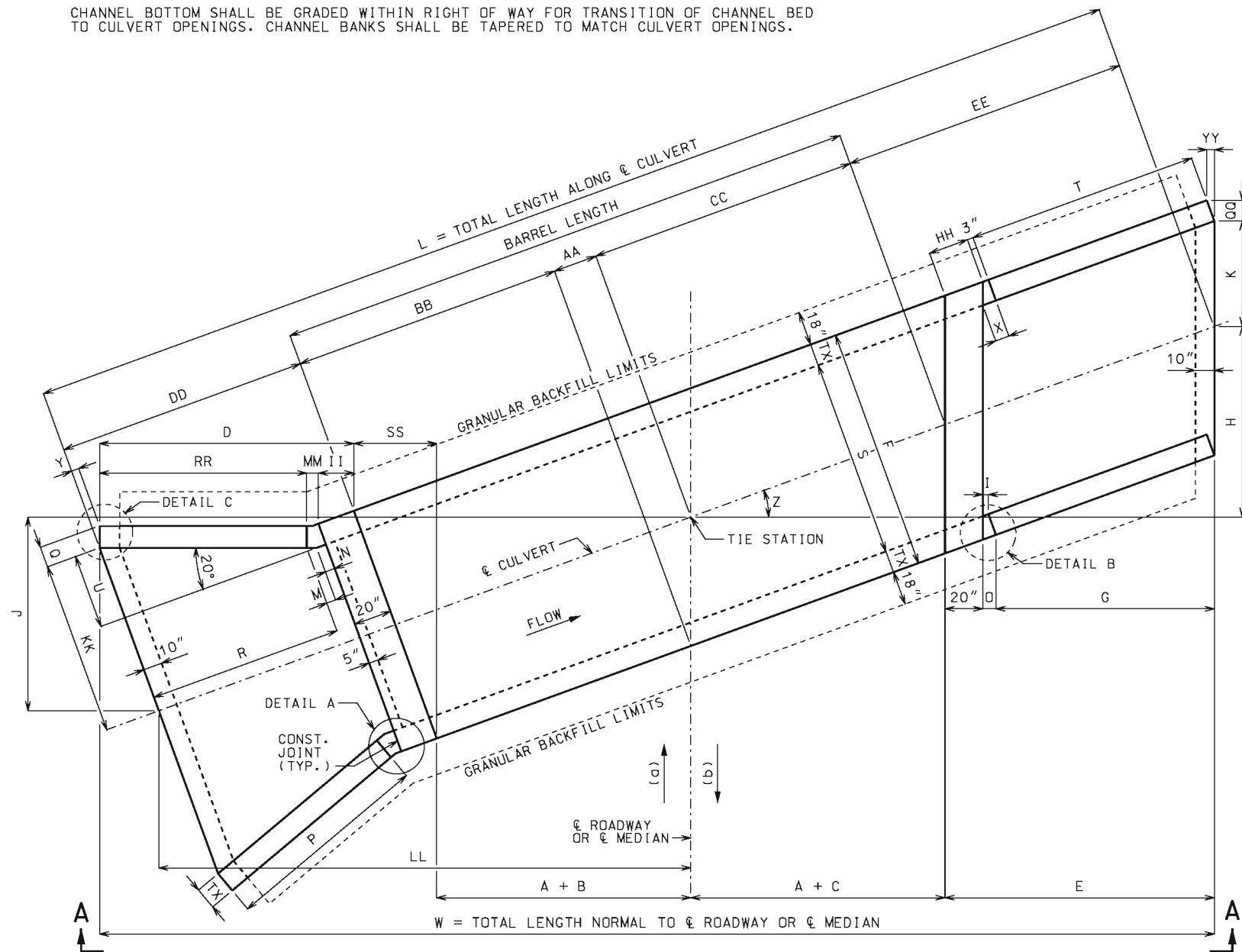
DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".

|                                                                                                                                              |                                        |           |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                        |           |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                        |           |
|                                                         | <b>CONCRETE SINGLE BOX CULVERT</b>     |           |
|                                                                                                                                              | SKEW: RIGHT ADVANCE<br>WINGS: STRAIGHT |           |
| SECTIONS                                                                                                                                     |                                        | SHEET NO. |
| DATE EFFECTIVE: 01/01/2021                                                                                                                   |                                        | 703.14J   |
| DATE PREPARED: 10/14/2020                                                                                                                    |                                        | 3 OF 3    |



CHANNEL BOTTOM SHALL BE GRADED WITHIN RIGHT OF WAY FOR TRANSITION OF CHANNEL BED TO CULVERT OPENINGS. CHANNEL BANKS SHALL BE TAPERED TO MATCH CULVERT OPENINGS.



(a) AHEAD STATION WHERE STREAM FLOWS LEFT TO RIGHT. (b) AHEAD STATION WHERE STREAM FLOWS RIGHT TO LEFT.

## EQUATIONS FOR COMPUTING $\alpha$ , $\beta$ , B AND C

$$\alpha = \text{ANGLE OF BARREL SLOPE WITH HORIZONTAL NORMAL TO } \text{CULVERT OR } \text{MEDIAN} = \arctan\left(\frac{\text{ELEV. 1} - \text{ELEV. 2}}{A + C + E + LL}\right)$$

$$\beta = \text{ANGLE OF FILL SLOPE WITH HORIZONTAL NORMAL TO } \text{CULVERT OR } \text{MEDIAN} = \arctan\left(\frac{\text{VER.}}{\text{HOR.}}\right)$$

$$B = \text{HORIZONTAL DISTANCE FROM UPSTREAM EDGE OF SHOULDER TO } \text{CULVERT OR } \text{MEDIAN} = \frac{\text{RDWY. FILL} + A(\text{CS}) - A(\text{TAN } \alpha)}{\text{TAN } \beta + \text{TAN } \alpha}$$

$$C = \text{HORIZONTAL DISTANCE FROM DOWNSTREAM EDGE OF SHOULDER TO } \text{CULVERT OR } \text{MEDIAN} = \frac{\text{RDWY. FILL} + A(\text{CS}) + A(\text{TAN } \alpha)}{\text{TAN } \beta - \text{TAN } \alpha}$$

CS = CROSS SLOPE OF EACH PART OF ROADWAY INCLUDING CROWN, LANES AND SHOULDERS. CS IS POSITIVE IF RISING AND NEGATIVE IF FALLING AWAY FROM CULVERT OR MEDIAN.

THE TERM "A(CS)" IS THE DIFFERENCE IN ELEVATION BETWEEN CULVERT OR MEDIAN AND THE TOP OF THE FILL SLOPE NORMAL TO CULVERT OR MEDIAN. THIS TERM SHALL BE ADJUSTED FOR UNSYMMETRICAL AND NONSTANDARD ROADWAYS.

TO ACCOUNT FOR A VARYING PROFILE GRADE THE CULVERT FILL SHALL BE BASED ON STATIONS THAT CORRESPOND TO THE CORNERS OF THE INSIDE FACE OF THE HEADWALLS THAT PRODUCE MAXIMUM VALUES FOR B AND C.

SEE ROADWAY PLANS FOR SLOPES, CULVERT FILL AND ELEVATIONS 1 AND 2. ELEVATIONS 1 AND 2 CORRESPOND TO UPPER AND LOWER FLOW LINE ELEVATIONS AND MAY BE BELOW THE NATURAL STREAM BOTTOM DUE TO ENVIRONMENTAL REQUIREMENTS.

## LAYOUT DIMENSIONS

| VARIABLE | DIMENSION                                           | VARIABLE | DIMENSION               | VARIABLE | DIMENSION                |
|----------|-----------------------------------------------------|----------|-------------------------|----------|--------------------------|
| $\alpha$ | SEE EQUATIONS                                       | N        | 3" + TX(TAN 10°)        | CC       | (A + C)(SEC Z)           |
| $\beta$  | SEE EQUATIONS                                       | O        | I + YY                  | DD       | R + M + N + 20"          |
| B        | SEE EQUATIONS                                       | P        | 2V[SEC(Z + 20°)]        | EE       | E(SEC Z)                 |
| C        | SEE EQUATIONS                                       | Q        | TX(COS 20°)             | HH       | 20"(SEC Z)               |
| D        | Z ≥ 20°: II + MM + RR<br>Z < 20°: II + MM + RR + TT | R        | P(COS 20°)              | II       | 20"(COS Z)               |
| E        | G + O + 20"                                         | T        | G(SEC Z)                | KK       | S/2 + U                  |
| F        | S + 2TX                                             | U        | (R + M)(TAN 20°)        | LL       | (AA + BB + DD)(COS Z)    |
| G        | 2V                                                  | V        | HT + TS - 12"           | MM       | 3"[COS Z + COS(Z - 20°)] |
| H        | (A + C + E)(TAN Z)                                  | W        | 2A + B + C + D + E + SS | QQ       | TX(COS Z)                |
| I        | 3"(COS Z)                                           | X        | 3" + TX(TAN Z)          | RR       | P[COS(Z - 20°)]          |
| J        | (AA + BB + DD)(SIN Z)                               | Y        | TX(SIN 20°)             | SS       | F(SIN Z)                 |
| K        | S(SEC Z)/2                                          | Z        | SKEW ANGLE              | TT       | TX[SIN(20° - Z)]         |
| L        | AA + BB + CC + DD + EE                              | AA       | F(TAN Z)/2              | YY       | TX(SIN Z)                |
| M        | N(COS 20°)                                          | BB       | (A + B)(SEC Z)          | TW       | MAX{3'-4" OR (BS + 12")} |

## GENERAL NOTES:

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c = 4,000$  PSI  
REINFORCING STEEL (GRADE 60)  $f_y = 60,000$  PSI

**MISCELLANEOUS:**  
FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3. FOR SECTION DETAILS, SEE SHEET 3 OF 3. FOR MEMBER THICKNESS, SEE 703.17.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

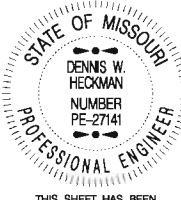
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

WHEN ALTERNATE PRECAST CONCRETE BOX CULVERT SECTIONS ARE USED, THE MINIMUM DISTANCE FROM INSIDE FACE OF HEADWALLS TO PRECAST SECTIONS MEASURED ALONG THE SHORTEST WALL SHALL BE 3 FEET. REINFORCEMENT AND DIMENSIONS FOR WINGS AND HEADWALLS SHALL BE IN ACCORDANCE WITH MISSOURI STANDARD PLANS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**CONCRETE SINGLE BOX CULVERT**

SKEW: RIGHT ADVANCE  
WINGS: FLARED

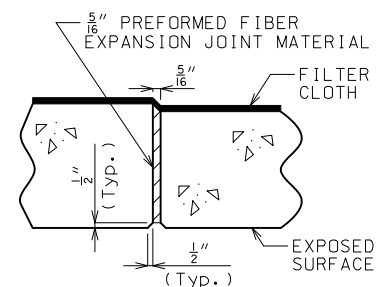
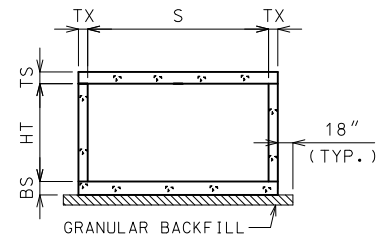
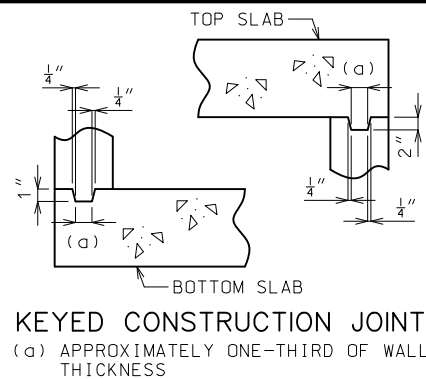
LAYOUT

DATE EFFECTIVE: 07/01/2015  
DATE PREPARED: 6/4/2015

**703.15E**

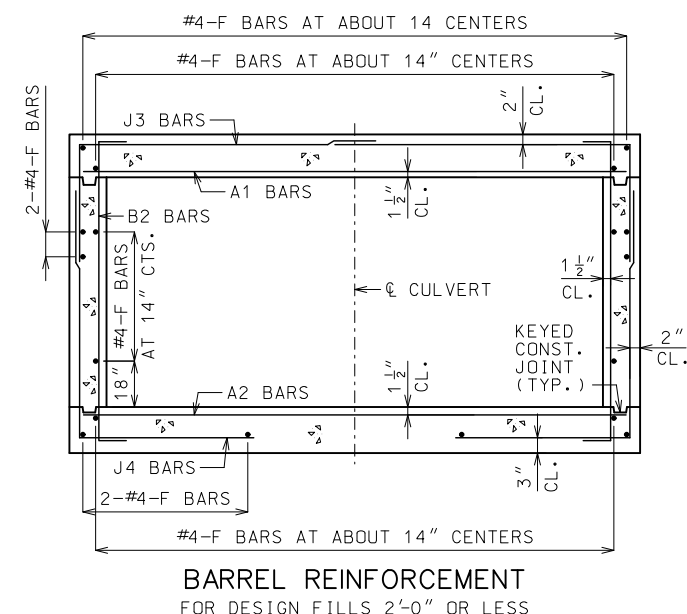
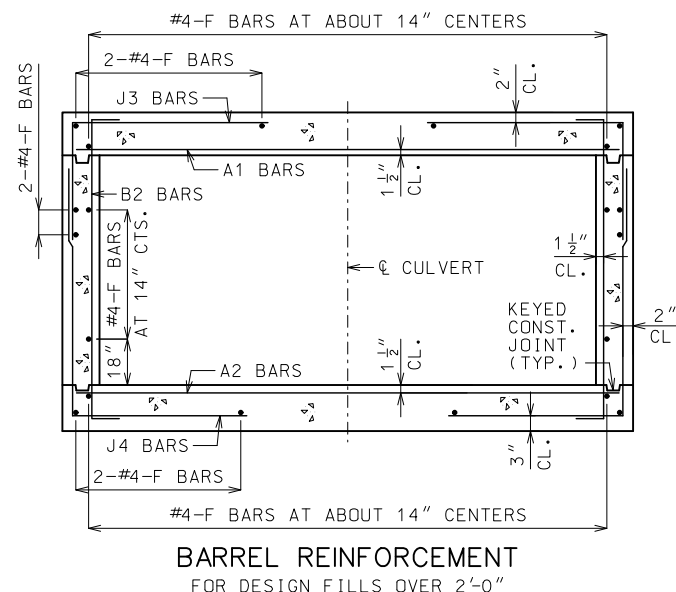
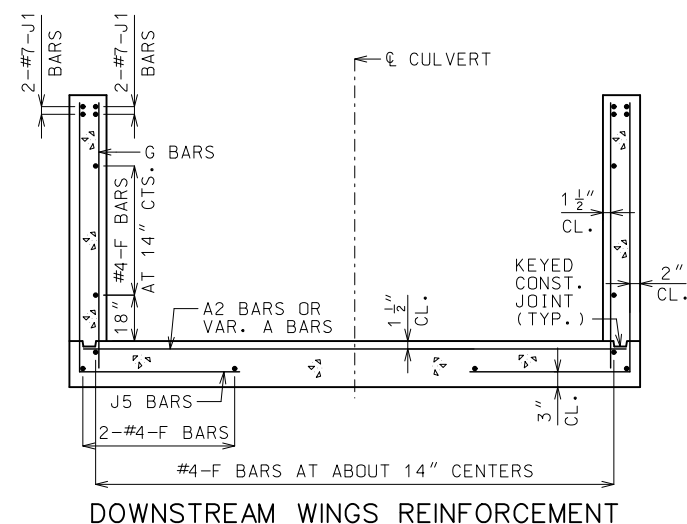
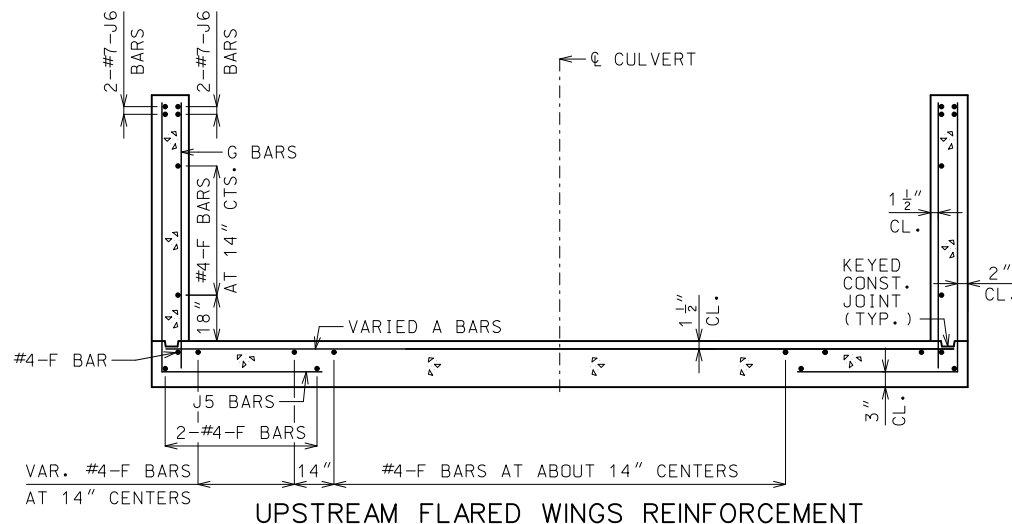
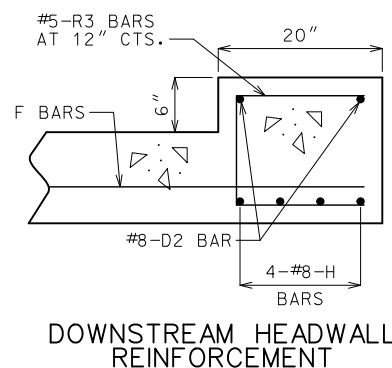
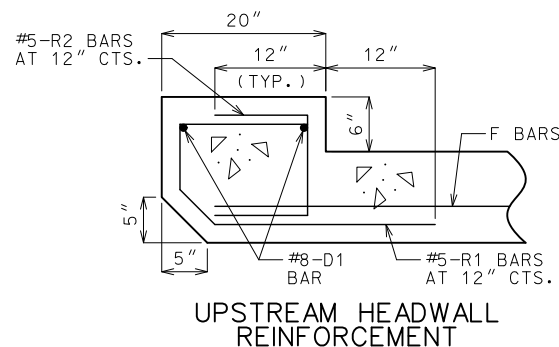
SHEET NO.  
1 OF 3





PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



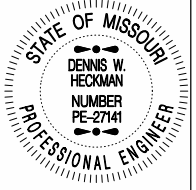
#### GENERAL NOTES:

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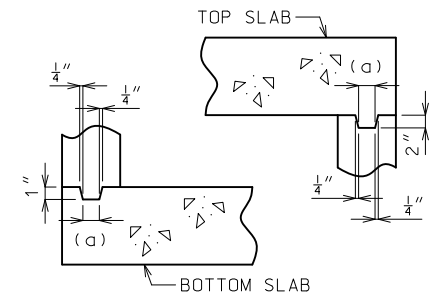
BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO  $\phi$  CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

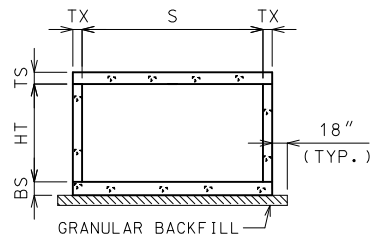
MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

|                                                                                                                                                                                                                                  |                                                                                            |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                            |                     |
|                                                                                                                                             | <b>CONCRETE SINGLE BOX CULVERT</b><br>SKEW: RIGHT ADVANCE<br>WINGS: FLARED<br><br>SECTIONS |                     |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                          | <b>703.15E</b>                                                                             | SHEET NO.<br>3 OF 3 |

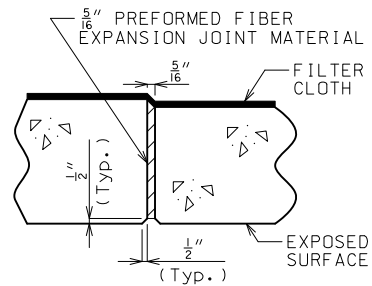




**KEYED CONSTRUCTION JOINT**  
(a) APPROXIMATELY ONE-THIRD OF WALL THICKNESS



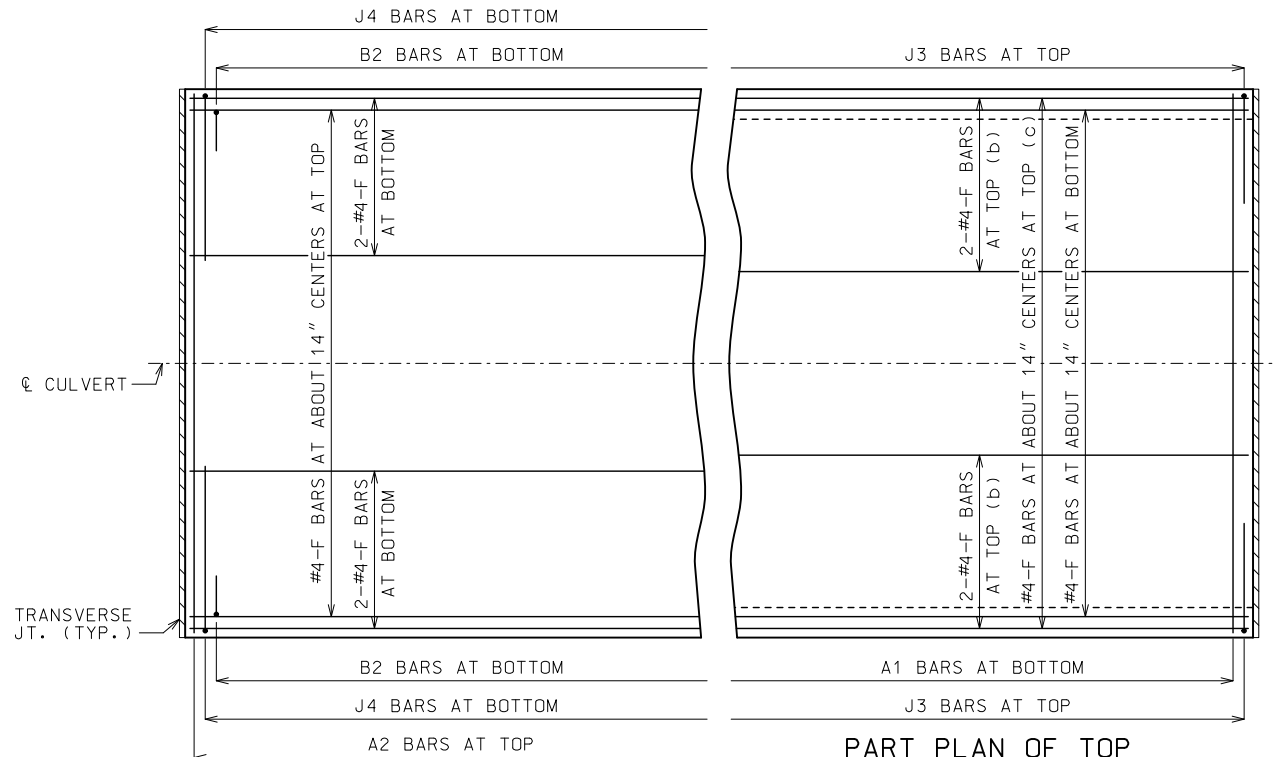
**GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS**



**TRANSVERSE JOINT THRU BARREL**

PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

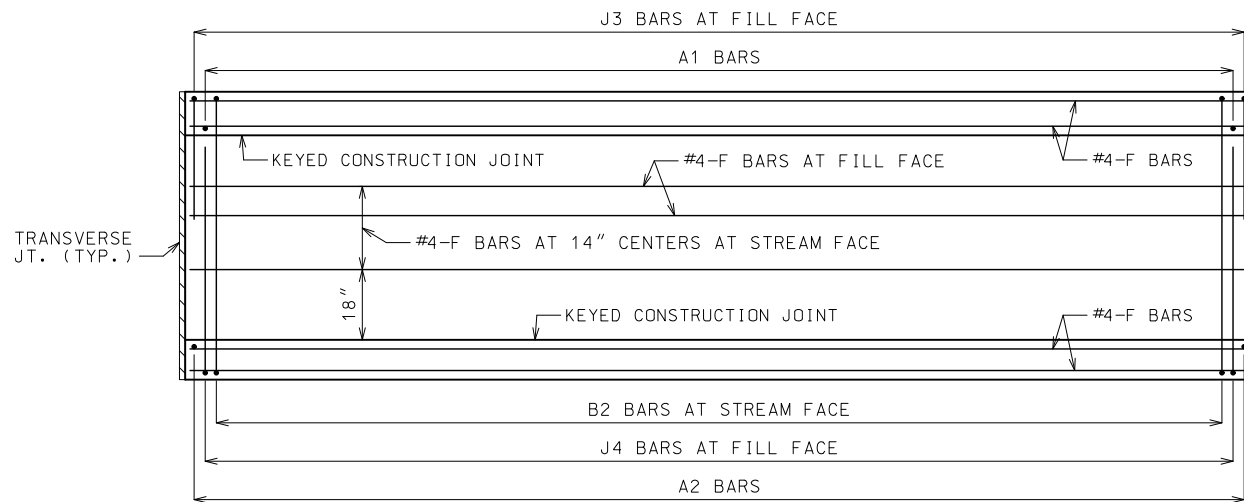
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**PART PLAN OF BOTTOM SLAB REINFORCEMENT**

**PART PLAN OF TOP SLAB REINFORCEMENT**

(b) FOR DESIGN FILLS OVER 2'-0"  
(c) FOR DESIGN FILLS 2'-0" OR LESS



**ELEVATION OF WALL REINFORCEMENT**

**GENERAL NOTES**

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

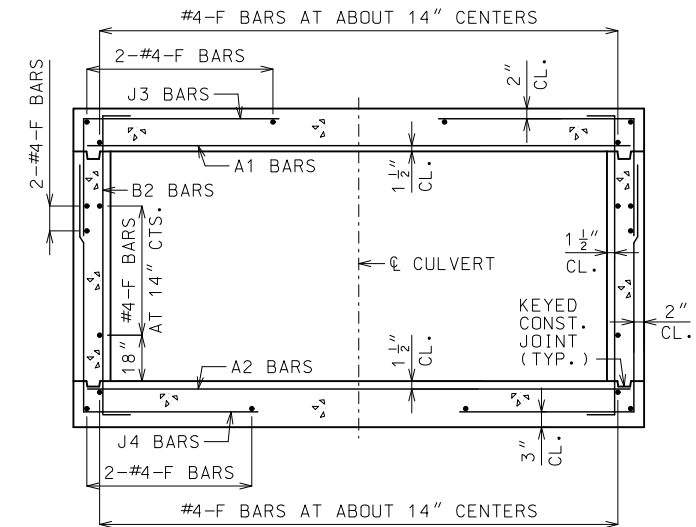
**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c = 4,000$  PSI  
REINFORCING STEEL (GRADE 60)  $f_y = 60,000$  PSI

**MISCELLANEOUS:**  
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS, SEE 703.17.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PART PLANS AND ELEVATION.

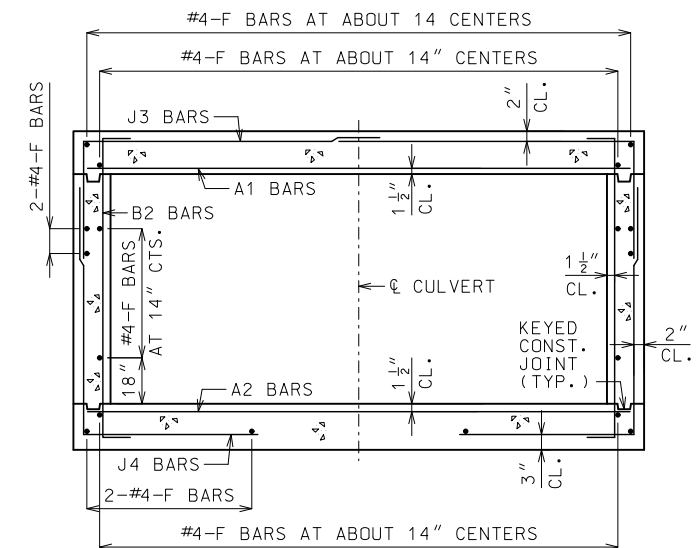
DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".



**BARREL REINFORCEMENT**

FOR DESIGN FILLS OVER 2'-0"  
SYMMETRICAL ABOUT AND NORMAL TO CULVERT.

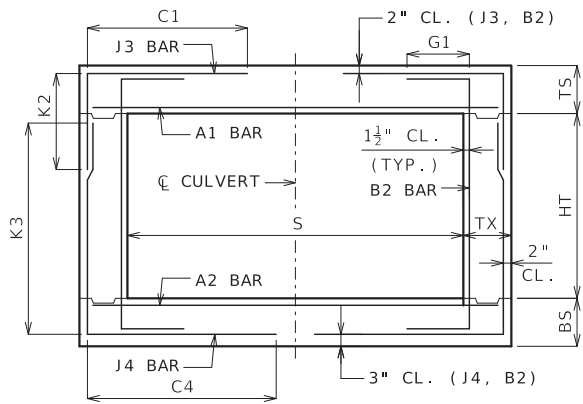


**BARREL REINFORCEMENT**

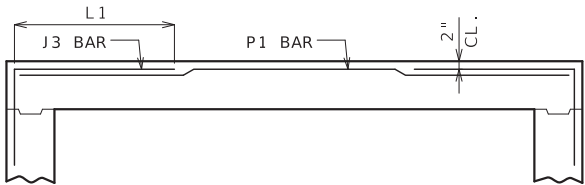
FOR DESIGN FILLS 2'-0" OR LESS  
SYMMETRICAL ABOUT AND NORMAL TO CULVERT.

|                                                         |  |                                                                                                                                            |  |
|---------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                         |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |
|                                                         |  | <b>CONCRETE SINGLE BOX CULVERT</b><br>CUT SECTION                                                                                          |  |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020 |  | <b>703.16</b>                                                                                                                              |  |
|                                                         |  | SHEET NO.<br>1 OF 1                                                                                                                        |  |

| SPAN (S) = 3 FT |                     |       |       |               |      |         |      |      |      |      |    |         |                  |         |      |      |      | HEIGHT (HT) = 2 FT OR 3 FT |    |         |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|-------|-------|---------------|------|---------|------|------|------|------|----|---------|------------------|---------|------|------|------|----------------------------|----|---------|------|-----------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |       |       | TOP SLAB BARS |      |         |      |      |      |      |    |         | BOTTOM SLAB BARS |         |      |      |      |                            |    |         |      | WALL BARS |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |       |       | A1 BARS       |      | J3 BARS |      |      |      |      |    | A2 BARS |                  | J4 BARS |      |      |      |                            |    | B2 BARS |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |       |       | TS            | BS   | TX      | SIZE | SPA. | SIZE | SPA. | C1 | K2      |                  | SIZE    | SPA. | SIZE | SPA. | C4                         | K3 |         | SIZE | SPA.      | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | HT=2'               | HT=3' | HT=2' |               |      |         |      |      |      |      |    | HT=3'   |                  |         |      |      |      |                            |    |         |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 9                   | 8     | 8     | 4             | 7    | 4       | 12   | 32.5 | 25.3 | 33.6 | 4  | 11.5    | 4                | 12      | 32.5 | 28   | 40   | 5                          | 12 | 1       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 9                   | 8     | 8     | 4             | 7    | 4       | 12   | 32.5 | 25.3 | 33.6 | 4  | 11.5    | 4                | 12      | 30.8 | 28   | 40   | 5                          | 12 | 12      |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 9                   | 8     | 8     | 4             | 7    | 4       | 12   | 32.5 | 25.3 | 33.6 | 4  | 11.5    | 4                | 12      | 30.8 | 28   | 40   | 5                          | 12 | 12      |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 26.4 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 26.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 24.6 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 24.6 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 23.8 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 23.8 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 12      | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 8     | 8     | 4             | 12   | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 11      | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 8     | 8     | 4             | 11.5 | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 10      | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 8                   | 8     | 8     | 4             | 10.5 | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 9       | 4                | 12      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 8                   | 8     | 8     | 4             | 9.5  | 4       | 12   | 22.0 | 24.1 | 32.4 | 4  | 8.5     | 4                | 11.5    | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 8                   | 8     | 8     | 4             | 9    | 4       | 11.5 | 22.0 | 24.1 | 32.4 | 4  | 8       | 4                | 10.5    | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 8                   | 8     | 8     | 4             | 8.5  | 4       | 11   | 22.0 | 24.1 | 32.4 | 4  | 7.5     | 4                | 10      | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 8                   | 8     | 8     | 4             | 8    | 4       | 10   | 22.0 | 24.1 | 32.4 | 4  | 7       | 4                | 9.5     | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 8                   | 8     | 8     | 4             | 7.5  | 4       | 9.5  | 22.0 | 24.1 | 32.4 | 4  | 6.5     | 4                | 8.5     | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 8                   | 8     | 8     | 4             | 7    | 4       | 9    | 22.0 | 24.1 | 32.4 | 4  | 6       | 4                | 8       | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 8                   | 8     | 8     | 4             | 6.5  | 4       | 8.5  | 22.0 | 24.1 | 32.4 | 5  | 9       | 4                | 8       | 22.0 | 28   | 40   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 8                   | 9     | 8     | 4             | 6.5  | 4       | 8    | 22.0 | 24.1 | 32.1 | 4  | 6       | 4                | 11      | 21.5 | 29   | 41   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 8                   | 9     | 8     | 4             | 6    | 4       | 8    | 22.0 | 24.1 | 32.1 | 5  | 9       | 4                | 10      | 21.5 | 29   | 41   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 8                   | 9     | 8     | 4             | 6    | 4       | 7.5  | 22.0 | 24.1 | 32.1 | 5  | 8.5     | 4                | 10      | 21.5 | 29   | 41   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 8                   | 9     | 8     | 4             | 6    | 4       | 7    | 22.0 | 24.1 | 32.1 | 5  | 8       | 4                | 9.5     | 21.5 | 29   | 41   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 8                   | 10    | 8     | 4             | 6    | 4       | 7    | 22.0 | 24.0 | 31.9 | 5  | 8.5     | 4                | 12      | 21.5 | 30   | 42   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 8                   | 10    | 8     | 4             | 6    | 4       | 6.5  | 22.0 | 24.0 | 31.9 | 5  | 8       | 4                | 12      | 21.5 | 30   | 42   | 5                          | 12 | 0       |      |           |    |  |  |  |  |  |  |  |  |  |  |  |  |



BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



ALTERNATE J3 BAR

AT CONTRACTOR'S OPTION, ALTERNATE J3 BARS MAY BE USED WHEN THE DISTANCE BETWEEN THE ENDS OF J3 BARS IN THE TOP SLAB IS LESS THAN 2'-0". DIMENSION L1 (NOT C1) SHALL BE USED WITH ALTERNATE J3 BARS, WHERE L1 IS EQUAL TO 18", 22" AND 28" FOR #4, #5 AND #6 BARS, RESPECTIVELY. ADDITIONAL P1 BARS ARE REQUIRED WITH ALTERNATE J3 BARS WITH A LENGTH EQUAL TO A1 BARS, AND SIZE AND SPACING EQUAL TO J3 BARS. NO ADDITIONAL PAYMENT WILL BE MADE FOR THIS SUBSTITUTION.

| SPAN (S) = 3 FT |                     |    |    |               |      |         |      |      |       |       |      |         |                  |         |      |       |       | HEIGHT (HT) = 4 FT OR 5 FT |      |         |  |           |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|---------------|------|---------|------|------|-------|-------|------|---------|------------------|---------|------|-------|-------|----------------------------|------|---------|--|-----------|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       |      |         | BOTTOM SLAB BARS |         |      |       |       |                            |      |         |  | WALL BARS |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |      | A2 BARS |                  | J4 BARS |      |       |       |                            |      | B2 BARS |  |           |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       | SIZE | SPA.    | SIZE             | SPA.    | C4   | K3    |       | SIZE                       | SPA. | G1      |  |           |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |               |      |         |      |      | HT=4' | HT=5' |      |         |                  |         |      | HT=4' | HT=5' |                            |      |         |  |           |  |  |  |  |  |  |  |  |  |
| 1 FT            | 9                   | 8  | 8  | 4             | 6.5  | 4       | 12   | 32.5 | 25.3  | 30.3  | 4    | 10.5    | 4                | 12      | 32.5 | 52    | 64    | 5                          | 12   | 12      |  |           |  |  |  |  |  |  |  |  |  |
| 2 FT            | 9                   | 8  | 8  | 4             | 6.5  | 4       | 12   | 32.5 | 25.3  | 30.3  | 4    | 10      | 4                | 12      | 32.5 | 52    | 64    | 5                          | 12   | 12      |  |           |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 9                   | 8  | 8  | 4             | 6.5  | 4       | 12   | 32.5 | 25.3  | 30.3  | 4    | 10      | 4                | 12      | 32.5 | 52    | 64    | 5                          | 12   | 12      |  |           |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 32.5 | 24.3  | 29.1  | 4    | 12      | 4                | 12      | 32.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 36.1 | 24.3  | 29.1  | 4    | 12      | 4                | 12      | 33.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 32.5 | 24.3  | 29.1  | 4    | 12      | 4                | 12      | 32.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 32.5 | 24.3  | 29.1  | 4    | 12      | 4                | 12      | 32.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 35.6 | 24.3  | 29.1  | 4    | 12      | 4                | 12      | 32.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 34.4 | 24.3  | 29.1  | 4    | 12      | 4                | 11.5    | 36.1 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 33.5 | 24.3  | 29.1  | 4    | 12      | 4                | 11      | 35.3 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 32.5 | 24.3  | 29.1  | 4    | 12      | 4                | 10.5    | 34.8 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 8  | 8  | 4             | 12   | 4       | 12   | 31.6 | 24.3  | 29.1  | 4    | 10.5    | 4                | 10      | 34.4 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 8  | 8  | 4             | 11.5 | 4       | 11   | 31.6 | 24.3  | 29.1  | 4    | 9.5     | 4                | 9.5     | 33.9 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 24 FT           | 8                   | 8  | 8  | 4             | 10.5 | 4       | 10   | 31.6 | 24.3  | 29.1  | 4    | 9       | 4                | 9       | 33.9 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 26 FT           | 8                   | 8  | 8  | 4             | 9.5  | 4       | 9.5  | 31.3 | 24.3  | 29.1  | 4    | 8.5     | 4                | 8       | 33.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 28 FT           | 8                   | 8  | 8  | 4             | 9    | 4       | 8.5  | 31.3 | 24.3  | 29.1  | 4    | 7.5     | 4                | 7.5     | 33.0 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 30 FT           | 8                   | 8  | 8  | 4             | 8.5  | 4       | 8    | 31.3 | 24.3  | 29.1  | 4    | 7       | 4                | 7       | 33.0 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 32 FT           | 8                   | 8  | 8  | 4             | 8    | 4       | 7.5  | 30.8 | 24.3  | 29.1  | 4    | 7       | 4                | 6.5     | 33.0 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 34 FT           | 8                   | 8  | 8  | 4             | 7.5  | 4       | 7    | 30.8 | 24.3  | 29.1  | 4    | 6.5     | 4                | 6.5     | 32.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 36 FT           | 8                   | 8  | 8  | 4             | 7    | 4       | 7    | 30.8 | 24.3  | 29.1  | 4    | 6       | 4                | 6       | 32.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 38 FT           | 8                   | 8  | 8  | 4             | 6.5  | 4       | 6.5  | 30.8 | 24.3  | 29.1  | 5    | 9       | 5                | 7       | 32.5 | 52    | 64    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 40 FT           | 8                   | 9  | 8  | 4             | 6.5  | 4       | 6    | 30.8 | 24.0  | 28.8  | 4    | 6       | 4                | 6.5     | 32.5 | 53    | 65    | 5                          | 12   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 42 FT           | 8                   | 9  | 8  | 4             | 6    | 4       | 6    | 30.8 | 24.0  | 28.8  | 5    | 9       | 4                | 6       | 32.5 | 53    | 65    | 5                          | 11.5 | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 44 FT           | 8                   | 9  | 8  | 4             | 6    | 5       | 6.5  | 30.8 | 24.0  | 28.8  | 5    | 8.5     | 4                | 6       | 32.5 | 53    | 65    | 5                          | 11   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 46 FT           | 8                   | 9  | 8  | 4             | 6    | 5       | 6.5  | 30.4 | 24.0  | 28.8  | 5    | 8       | 5                | 6.5     | 34.8 | 53    | 65    | 5                          | 10.5 | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 48 FT           | 8                   | 9  | 8  | 4             | 6    | 5       | 6    | 30.4 | 24.0  | 28.8  | 5    | 8       | 5                | 6.5     | 34.8 | 53    | 65    | 5                          | 10   | 0       |  |           |  |  |  |  |  |  |  |  |  |
| 50 FT           | 8                   | 9  | 8  | 4             | 6    | 5       | 6    | 30.4 | 24.0  | 28.8  | 5    | 7.5     | 5                | 6       | 34.8 | 53    | 65    | 5                          | 9.5  | 0       |  |           |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 5 FT |                     |    |    |               |      |         |      |      |       |       |                  |      |         |      |      |       | HEIGHT (HT) = 3 FT OR 4 FT |           |      |    |         |  |  |  |  |  |
|-----------------|---------------------|----|----|---------------|------|---------|------|------|-------|-------|------------------|------|---------|------|------|-------|----------------------------|-----------|------|----|---------|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       | BOTTOM SLAB BARS |      |         |      |      |       |                            | WALL BARS |      |    |         |  |  |  |  |  |
|                 |                     |    |    | A1 BARS       |      | J3 BARS |      |      |       |       | A2 BARS          |      | J4 BARS |      |      |       |                            |           |      |    | B2 BARS |  |  |  |  |  |
|                 | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       | SIZE             | SPA. | SIZE    | SPA. | C4   | K3    |                            | SIZE      | SPA. | G1 |         |  |  |  |  |  |
|                 |                     |    |    |               |      |         |      |      | HT=3' | HT=4' |                  |      |         |      |      | HT=3' | HT=4'                      |           |      |    |         |  |  |  |  |  |
| 1 FT            | 10                  | 8  | 8  | 5             | 8    | 4       | 10.5 | 44.9 | 26.5  | 33.0  | 5                | 8.5  | 4       | 6    | 35.4 | 40    | 52                         | 5         | 12   | 1  |         |  |  |  |  |  |
| 2 FT            | 10                  | 8  | 8  | 5             | 8    | 4       | 10.5 | 44.9 | 26.5  | 33.0  | 5                | 8    | 4       | 6    | 32.0 | 40    | 52                         | 5         | 12   | 12 |         |  |  |  |  |  |
| 2'- 4'          | 10                  | 8  | 8  | 5             | 8    | 4       | 10.5 | 44.9 | 26.5  | 33.0  | 5                | 8    | 4       | 6    | 32.0 | 40    | 52                         | 5         | 12   | 12 |         |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 4             | 8.5  | 4       | 10.5 | 28.5 | 24.5  | 30.6  | 4                | 7.5  | 4       | 10   | 28.5 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 6 FT            | 8                   | 8  | 8  | 4             | 10   | 4       | 12   | 27.3 | 24.5  | 30.6  | 4                | 8    | 4       | 10   | 27.3 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 8 FT            | 8                   | 8  | 8  | 4             | 9.5  | 4       | 11   | 26.5 | 24.5  | 30.6  | 4                | 8    | 4       | 9.5  | 26.5 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 10 FT           | 8                   | 8  | 8  | 4             | 10   | 4       | 12   | 25.1 | 24.5  | 30.6  | 4                | 8.5  | 4       | 10.5 | 25.1 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 12 FT           | 8                   | 8  | 8  | 4             | 8.5  | 4       | 10   | 25.1 | 24.5  | 30.6  | 4                | 7    | 4       | 9    | 25.1 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 14 FT           | 8                   | 8  | 8  | 4             | 7.5  | 4       | 8.5  | 25.1 | 24.5  | 30.6  | 4                | 6    | 4       | 7.5  | 25.1 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 16 FT           | 8                   | 8  | 8  | 4             | 6.5  | 4       | 7.5  | 25.1 | 24.5  | 30.6  | 5                | 8.5  | 4       | 7    | 25.1 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 18 FT           | 8                   | 8  | 8  | 4             | 6    | 4       | 6.5  | 25.1 | 24.5  | 30.6  | 5                | 8    | 4       | 6    | 25.1 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 20 FT           | 8                   | 8  | 8  | 4             | 6    | 4       | 6    | 25.1 | 24.5  | 30.6  | 5                | 8    | 5       | 6.5  | 25.1 | 40    | 52                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 22 FT           | 8                   | 9  | 8  | 4             | 6    | 5       | 6.5  | 25.1 | 24.0  | 30.0  | 5                | 7.5  | 4       | 7    | 23.8 | 41    | 53                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 24 FT           | 8                   | 9  | 8  | 4             | 6    | 5       | 6    | 25.1 | 24.0  | 30.0  | 5                | 7.5  | 4       | 6.5  | 23.8 | 41    | 53                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 26 FT           | 9                   | 10 | 8  | 5             | 8.5  | 4       | 6.5  | 24.5 | 25.0  | 31.0  | 5                | 7    | 4       | 8.5  | 23.8 | 42    | 54                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 28 FT           | 9                   | 10 | 8  | 5             | 8.5  | 4       | 6    | 24.5 | 25.0  | 31.0  | 5                | 7    | 4       | 8    | 23.8 | 42    | 54                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 30 FT           | 9                   | 11 | 8  | 5             | 8    | 5       | 6.5  | 24.5 | 25.5  | 31.5  | 5                | 6.5  | 4       | 9    | 23.1 | 43    | 55                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 32 FT           | 10                  | 11 | 8  | 5             | 8    | 4       | 6    | 23.8 | 26.0  | 32.0  | 5                | 6.5  | 4       | 8    | 23.1 | 43    | 55                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 34 FT           | 10                  | 12 | 8  | 5             | 7.5  | 5       | 7.5  | 23.8 | 26.5  | 32.5  | 5                | 6    | 4       | 9    | 22.5 | 44    | 56                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 36 FT           | 10                  | 12 | 8  | 5             | 7    | 5       | 7.5  | 23.8 | 26.5  | 32.5  | 5                | 6    | 4       | 8.5  | 22.5 | 44    | 56                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 38 FT           | 11                  | 12 | 8  | 5             | 7    | 4       | 6    | 23.8 | 27.0  | 33.0  | 5                | 6    | 4       | 8    | 23.1 | 44    | 56                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 40 FT           | 11                  | 13 | 8  | 5             | 6.5  | 5       | 8.5  | 23.8 | 27.5  | 33.5  | 5                | 6    | 4       | 8.5  | 22.5 | 45    | 57                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 42 FT           | 12                  | 13 | 8  | 5             | 6.5  | 4       | 6    | 23.1 | 28.0  | 34.0  | 5                | 6    | 4       | 8    | 23.1 | 45    | 57                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 44 FT           | 12                  | 13 | 8  | 5             | 6.5  | 5       | 9    | 23.1 | 28.0  | 34.0  | 5                | 6    | 4       | 7.5  | 23.1 | 45    | 57                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 46 FT           | 12                  | 14 | 8  | 5             | 6    | 5       | 8.5  | 23.8 | 28.5  | 34.5  | 6                | 8    | 4       | 7.5  | 22.5 | 46    | 58                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 48 FT           | 13                  | 14 | 8  | 5             | 6    | 4       | 6    | 23.1 | 29.0  | 35.0  | 6                | 8    | 4       | 7.5  | 23.1 | 46    | 58                         | 5         | 12   | 0  |         |  |  |  |  |  |
| 50 FT           | 13                  | 14 | 8  | 5             | 6    | 5       | 8.5  | 23.1 | 29.0  | 35.0  | 6                | 8    | 4       | 7.5  | 23.1 | 46    | 58                         | 5         | 12   | 0  |         |  |  |  |  |  |

| SPAN (S) = 5 FT |                     |    |    |               |      |         |      |      |       |         |      |                  |      |      |      |         | HEIGHT (HT) = 7 FT OR 8 FT |      |      |           |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|---------------|------|---------|------|------|-------|---------|------|------------------|------|------|------|---------|----------------------------|------|------|-----------|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |         |      | BOTTOM SLAB BARS |      |      |      |         |                            |      |      | WALL BARS |  |  |  |  |  |  |  |  |
|                 |                     |    |    | A1 BARS       |      | J3 BARS |      |      |       | A2 BARS |      | J4 BARS          |      |      |      | B2 BARS |                            |      |      |           |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |                            | SIZE | SPA. | G1        |  |  |  |  |  |  |  |  |
|                 |                     |    |    |               |      |         |      |      | HT=7' | HT=8'   |      |                  |      |      |      | HT=7'   | HT=8'                      |      |      |           |  |  |  |  |  |  |  |  |
| 1 FT            | 10                  | 9  | 8  | 5             | 8    | 4       | 9.5  | 44.9 | 26.5  | 29.8    | 5    | 7.5              | 4    | 7    | 44.9 | 89      | 101                        | 5    | 12   | 1         |  |  |  |  |  |  |  |  |
| 2 FT            | 10                  | 9  | 8  | 5             | 8    | 4       | 8.5  | 44.9 | 26.5  | 29.8    | 5    | 7.5              | 4    | 6.5  | 44.9 | 89      | 101                        | 5    | 12   | 12        |  |  |  |  |  |  |  |  |
| 2'- 4'          | 10                  | 9  | 8  | 5             | 8    | 4       | 7.5  | 44.9 | 26.5  | 29.8    | 5    | 7.5              | 4    | 6    | 44.9 | 89      | 101                        | 5    | 12   | 12        |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 4             | 7.5  | 4       | 7.5  | 44.9 | 24.8  | 27.9    | 4    | 6.5              | 4    | 6    | 44.9 | 88      | 100                        | 5    | 12   | 0         |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 9  | 8  | 4             | 9    | 4       | 7.5  | 44.9 | 24.0  | 27.0    | 4    | 7.5              | 4    | 6.5  | 44.9 | 89      | 101                        | 5    | 12   | 0         |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 9  | 8  | 4             | 9    | 4       | 7    | 44.9 | 24.0  | 27.0    | 4    | 7.5              | 4    | 6    | 44.9 | 89      | 101                        | 5    | 12   | 0         |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 9  | 8  | 4             | 10   | 4       | 7.5  | 44.9 | 24.0  | 27.0    | 4    | 8                | 4    | 6.5  | 44.9 | 89      | 101                        | 5    | 12   | 0         |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 10 | 8  | 4             | 8.5  | 4       | 6.5  | 44.9 | 24.3  | 27.3    | 4    | 8                | 4    | 6.5  | 44.9 | 90      | 102                        | 5    | 12   | 0         |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 10 | 9  | 4             | 7.5  | 4       | 6.5  | 41.4 | 24.3  | 27.3    | 4    | 7                | 4    | 7    | 45.5 | 90      | 102                        | 5    | 12   | 0         |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 10 | 9  | 4             | 6.5  | 4       | 6    | 40.8 | 24.3  | 27.3    | 4    | 6                | 4    | 6.5  | 45.5 | 90      | 102                        | 5    | 11.5 | 0         |  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 10 | 9  | 4             | 6    | 5       | 6.5  | 40.0 | 24.3  | 27.3    | 5    | 9                | 4    | 6    | 45.5 | 90      | 102                        | 5    | 10.5 | 0         |  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 10 | 9  | 4             | 6    | 5       | 6    | 39.4 | 25.3  | 28.4    | 5    | 8                | 5    | 6.5  | 47.6 | 90      | 102                        | 5    | 10   | 0         |  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 10 | 9  | 4             | 6    | 6       | 7    | 42.1 | 25.3  | 28.4    | 5    | 7.5              | 5    | 6    | 47.6 | 90      | 102                        | 5    | 9    | 0         |  |  |  |  |  |  |  |  |
| 24 FT           | 9                   | 11 | 9  | 5             | 8.5  | 5       | 6    | 41.4 | 26.8  | 30.0    | 5    | 7.5              | 5    | 6    | 47.6 | 91      | 103                        | 5    | 8.5  | 0         |  |  |  |  |  |  |  |  |
| 26 FT           | 9                   | 11 | 9  | 5             | 8.5  | 5       | 6    | 41.4 | 26.8  | 30.0    | 5    | 7                | 6    | 7.5  | 49.6 | 91      | 103                        | 5    | 8.5  | 0         |  |  |  |  |  |  |  |  |
| 28 FT           | 9                   | 11 | 9  | 5             | 8.5  | 5       | 6    | 41.4 | 29.8  | 33.3    | 5    | 6.5              | 6    | 7    | 49.6 | 91      | 103                        | 5    | 8.5  | 0         |  |  |  |  |  |  |  |  |
| 30 FT           | 9                   | 11 | 9  | 5             | 8    | 5       | 6    | 40.8 | 29.8  | 33.3    | 5    | 6.5              | 6    | 6.5  | 49.6 | 91      | 103                        | 5    | 8.5  | 0         |  |  |  |  |  |  |  |  |
| 32 FT           | 10                  | 11 | 9  | 5             | 8    | 5       | 6    | 46.3 | 30.0  | 33.6    | 5    | 6.5              | 6    | 6    | 49.6 | 91      | 103                        | 5    | 8.5  | 0         |  |  |  |  |  |  |  |  |
| 34 FT           | 10                  | 11 | 9  | 5             | 7.5  | 5       | 6    | 45.5 | 30.0  | 33.6    | 5    | 6                | 6    | 6    | 49.6 | 91      | 103                        | 5    | 8.5  | 0         |  |  |  |  |  |  |  |  |
| 36 FT           | 10                  | 12 | 10 | 5             | 7    | 5       | 6.5  | 40.6 | 30.3  | 33.9    | 5    | 6                | 5    | 6    | 49.0 | 92      | 104                        | 5    | 8    | 0         |  |  |  |  |  |  |  |  |
| 38 FT           | 11                  | 12 | 10 | 5             | 7.5  | 5       | 6    | 43.4 | 31.6  | 35.4    | 5    | 6                | 6    | 7    | 51.1 | 92      | 104                        | 5    | 8    | 0         |  |  |  |  |  |  |  |  |
| 40 FT           | 11                  | 12 | 11 | 5             | 7.5  | 5       | 7    | 41.1 | 31.6  | 35.4    | 5    | 6                | 5    | 6.5  | 49.8 | 92      | 104                        | 5    | 7.5  | 0         |  |  |  |  |  |  |  |  |
| 42 FT           | 11                  | 13 | 11 | 5             | 7    | 5       | 7    | 41.1 | 31.9  | 35.6    | 5    | 6                | 5    | 6.5  | 49.8 | 93      | 105                        | 5    | 7.5  | 0         |  |  |  |  |  |  |  |  |
| 44 FT           | 12                  | 13 | 11 | 5             | 7    | 5       | 6.5  | 43.3 | 32.3  | 36.0    | 5    | 6                | 5    | 6    | 49.8 | 93      | 105                        | 5    | 7.5  | 0         |  |  |  |  |  |  |  |  |
| 46 FT           | 12                  | 13 | 11 | 5             | 7    | 5       | 6    | 43.3 | 32.3  | 36.0    | 5    | 6                | 5    | 6    | 49.8 | 93      | 105                        | 5    | 7.5  | 0         |  |  |  |  |  |  |  |  |
| 48 FT           | 12                  | 14 | 12 | 5             | 6.5  | 5       | 6.5  | 41.0 | 32.5  | 36.3    | 6    | 8                | 5    | 6.5  | 51.1 | 94      | 106                        | 5    | 7    | 0         |  |  |  |  |  |  |  |  |
| 50 FT           | 13                  | 14 | 12 | 5             | 6.5  | 5       | 6.5  | 43.3 | 33.9  | 37.8    | 6    | 8                | 5    | 6.5  | 51.1 | 94      | 106                        | 5    | 7    | 0         |  |  |  |  |  |  |  |  |

| SPAN (S) = 5 FT |                     |    |    |               |      |         |      |      |       |         |      |                  |      |      |      |         | HEIGHT (HT) = 5 FT OR 6 FT |      |      |           |  |  |  |  |  |  |
|-----------------|---------------------|----|----|---------------|------|---------|------|------|-------|---------|------|------------------|------|------|------|---------|----------------------------|------|------|-----------|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |         |      | BOTTOM SLAB BARS |      |      |      |         |                            |      |      | WALL BARS |  |  |  |  |  |  |
|                 |                     |    |    | A1 BARS       |      | J3 BARS |      |      |       | A2 BARS |      | J4 BARS          |      |      |      | B2 BARS |                            |      |      |           |  |  |  |  |  |  |
|                 | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |                            | SIZE | SPA. | G1        |  |  |  |  |  |  |
|                 |                     |    |    |               |      |         |      |      | HT=5' | HT=6'   |      |                  |      |      |      | HT=5'   | HT=6'                      |      |      |           |  |  |  |  |  |  |
| 1 FT            | 10                  | 8  | 8  | 5             | 8    | 4       | 10.5 | 44.9 | 26.3  | 30.6    | 5    | 8                | 4    | 6    | 44.9 | 64      | 76                         | 5    | 12   | 12        |  |  |  |  |  |  |
| 2 FT            | 10                  | 8  | 8  | 5             | 8    | 4       | 10.5 | 44.9 | 26.3  | 30.6    | 5    | 8                | 4    | 6    | 44.9 | 64      | 76                         | 5    | 12   | 12        |  |  |  |  |  |  |
| 2' - 4'         | 10                  | 8  | 8  | 5             | 8    | 4       | 10.5 | 44.9 | 26.3  | 30.6    | 5    | 8                | 4    | 6    | 44.9 | 64      | 76                         | 5    | 12   | 12        |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 4             | 8    | 4       | 11   | 44.9 | 24.1  | 28.3    | 4    | 7                | 4    | 8.5  | 44.9 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 6 FT            | 8                   | 8  | 8  | 4             | 9    | 4       | 10.5 | 39.5 | 24.1  | 28.3    | 4    | 7.5              | 4    | 8    | 38.1 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 8 FT            | 8                   | 8  | 8  | 4             | 9    | 4       | 10   | 34.6 | 24.1  | 28.3    | 4    | 7                | 4    | 7.5  | 34.6 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 10 FT           | 8                   | 8  | 8  | 4             | 9.5  | 4       | 11   | 30.6 | 24.1  | 28.3    | 4    | 8                | 4    | 8    | 30.6 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 12 FT           | 8                   | 8  | 8  | 4             | 8    | 4       | 9    | 29.9 | 24.1  | 28.3    | 4    | 6.5              | 4    | 7.5  | 30.6 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 14 FT           | 8                   | 8  | 8  | 4             | 7    | 4       | 8    | 29.9 | 24.1  | 28.3    | 4    | 6                | 4    | 6.5  | 29.9 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 16 FT           | 8                   | 8  | 8  | 4             | 6    | 4       | 7    | 29.3 | 24.1  | 28.3    | 5    | 8                | 4    | 6    | 29.9 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 18 FT           | 8                   | 8  | 8  | 4             | 6    | 4       | 6    | 29.3 | 24.1  | 28.3    | 5    | 8                | 5    | 6.5  | 29.9 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 20 FT           | 8                   | 8  | 8  | 4             | 6    | 5       | 6.5  | 29.3 | 24.1  | 28.3    | 5    | 8                | 5    | 6    | 29.9 | 64      | 76                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 22 FT           | 8                   | 9  | 8  | 4             | 6    | 5       | 6    | 29.3 | 24.5  | 28.5    | 5    | 7.5              | 4    | 6    | 29.9 | 65      | 77                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 24 FT           | 8                   | 9  | 8  | 5             | 9    | 6       | 7.5  | 32.0 | 28.1  | 32.8    | 5    | 7.5              | 5    | 6.5  | 29.9 | 65      | 77                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 26 FT           | 9                   | 10 | 8  | 5             | 8.5  | 5       | 6.5  | 29.3 | 25.1  | 29.3    | 5    | 7                | 4    | 6    | 30.6 | 66      | 78                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 28 FT           | 9                   | 10 | 8  | 5             | 8    | 5       | 6.5  | 29.3 | 25.1  | 29.3    | 5    | 7                | 5    | 7    | 29.9 | 66      | 78                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 30 FT           | 9                   | 10 | 8  | 5             | 7.5  | 5       | 6.5  | 29.3 | 29.6  | 34.4    | 5    | 6.5              | 5    | 6.5  | 29.9 | 66      | 78                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 32 FT           | 10                  | 11 | 8  | 5             | 7.5  | 5       | 7    | 29.3 | 26.6  | 30.8    | 5    | 6.5              | 5    | 7.5  | 30.6 | 67      | 79                         | 5    | 12   | 0         |  |  |  |  |  |  |
| 34 FT           | 10                  | 11 | 8  | 5             | 7.5  | 5       | 6.5  | 29.3 | 26.6  | 30.8    | 5    | 6.5              | 5    | 7    | 30.6 | 67      | 79                         | 5    | 11.5 | 0         |  |  |  |  |  |  |
| 36 FT           | 10                  | 11 | 8  | 5             | 7    | 5       | 6.5  | 29.3 | 30.4  | 35.3    | 5    | 6                | 5    | 6    | 30.6 | 67      | 79                         | 5    | 11   | 0         |  |  |  |  |  |  |
| 38 FT           | 11                  | 12 | 8  | 5             | 7    | 5       | 7    | 29.9 | 27.3  | 31.5    | 5    | 6                | 5    | 7    | 31.3 | 68      | 80                         | 5    | 10   | 0         |  |  |  |  |  |  |
| 40 FT           | 11                  | 12 | 8  | 5             | 6.5  | 5       | 6.5  | 29.9 | 31.3  | 36.0    | 5    | 6                | 5    | 6.5  | 31.3 | 68      | 80                         | 5    | 10   | 0         |  |  |  |  |  |  |
| 42 FT           | 11                  | 13 | 8  | 5             | 6.5  | 5       | 6    | 29.9 | 27.6  | 31.9    | 5    | 6                | 5    | 7    | 31.3 | 69      | 81                         | 5    | 9.5  | 0         |  |  |  |  |  |  |
| 44 FT           | 12                  | 13 | 8  | 5             | 6.5  | 5       | 6.5  | 29.9 | 28.0  | 32.3    | 5    | 6                | 5    | 6.5  | 32.0 | 69      | 81                         | 5    | 9.5  | 0         |  |  |  |  |  |  |
| 46 FT           | 12                  | 13 | 8  | 5             | 6    | 5       | 6    | 29.9 | 32.0  | 36.8    | 5    | 6                | 5    | 6    | 31.3 | 69      | 81                         | 5    | 9.5  | 0         |  |  |  |  |  |  |
| 48 FT           | 12                  | 14 | 9  | 5             | 6    | 5       | 7    | 30.4 | 28.4  | 32.5    | 6    | 8                | 5    | 8    | 31.8 | 70      | 82                         | 5    | 9.5  | 0         |  |  |  |  |  |  |
| 50 FT           | 13                  | 14 | 9  | 5             | 6    | 5       | 7.5  | 30.4 | 29.5  | 33.9    | 6    | 8                | 5    | 7.5  | 32.4 | 70      | 82                         | 5    | 9    | 0         |  |  |  |  |  |  |



| SPAN (S) = 6 FT |                  |    |    |               |      |         |      |      |       |       |       |         |      |                  |      |      |       |       |       |         |      |    |  |           | HEIGHT (HT) = 3 FT OR 4 FT OR 5 FT |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------------------|------|------|-------|-------|-------|---------|------|----|--|-----------|------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      | BOTTOM SLAB BARS |      |      |       |       |       |         |      |    |  | WALL BARS |                                    |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | A2 BARS |      | J4 BARS          |      |      |       |       |       | B2 BARS |      |    |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | SIZE             | SPA. | C4   | K3    |       |       | SIZE    | SPA. | G1 |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |               |      |         |      |      | HT=3' | HT=4' | HT=5' |         |      |                  |      |      | HT=3' | HT=4' | HT=5' |         |      |    |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 10               | 8  | 8  | 5             | 8    | 4       | 9    | 51.3 | 26.5  | 33.0  | 39.4  | 5       | 8    | 5                | 6    | 41.6 | 40    | 52    | 64    | 5       | 12   | 1  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 5             | 7.5  | 4       | 9.5  | 51.3 | 27.0  | 33.5  | 40.0  | 5       | 8    | 6                | 7.5  | 36.0 | 40    | 52    | 64    | 5       | 12   | 12 |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11               | 8  | 8  | 5             | 7.5  | 4       | 7.5  | 51.3 | 27.0  | 33.5  | 40.0  | 5       | 8    | 6                | 7.5  | 36.0 | 40    | 52    | 64    | 5       | 12   | 12 |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 4             | 6.5  | 4       | 7.5  | 32.8 | 24.5  | 30.6  | 36.9  | 5       | 8.5  | 4                | 6.5  | 32.0 | 40    | 52    | 64    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 4             | 7    | 4       | 8    | 30.4 | 24.5  | 30.6  | 36.9  | 5       | 9    | 4                | 7    | 30.4 | 40    | 52    | 64    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 4             | 6.5  | 4       | 7.5  | 29.6 | 24.5  | 30.6  | 36.9  | 5       | 8.5  | 4                | 6.5  | 29.6 | 40    | 52    | 64    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 4             | 7    | 4       | 8    | 27.3 | 24.5  | 30.6  | 36.9  | 4       | 6    | 4                | 7    | 27.3 | 40    | 52    | 64    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 8  | 8  | 4             | 6    | 4       | 7    | 27.3 | 24.5  | 30.6  | 36.9  | 5       | 8    | 4                | 6    | 27.3 | 40    | 52    | 64    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 8  | 8  | 4             | 6    | 4       | 6    | 27.3 | 24.5  | 30.6  | 36.9  | 5       | 8    | 5                | 6    | 27.3 | 40    | 52    | 64    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 8  | 8  | 4             | 6    | 5       | 6    | 27.3 | 28.3  | 35.4  | 42.6  | 5       | 8    | 6                | 7    | 30.4 | 40    | 52    | 64    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                | 9  | 8  | 5             | 8.5  | 6       | 7.5  | 30.4 | 24.0  | 30.0  | 36.0  | 5       | 7.5  | 4                | 6    | 26.4 | 41    | 53    | 65    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                | 9  | 8  | 5             | 7.5  | 6       | 7.5  | 30.4 | 28.4  | 35.4  | 42.5  | 5       | 7    | 5                | 6.5  | 26.4 | 41    | 53    | 65    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 9                | 10 | 8  | 5             | 7.5  | 5       | 6.5  | 26.4 | 25.0  | 31.0  | 37.0  | 5       | 7    | 4                | 6.5  | 25.6 | 42    | 54    | 66    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 9                | 11 | 8  | 5             | 7    | 5       | 6.5  | 26.4 | 25.5  | 31.5  | 37.5  | 5       | 6.5  | 4                | 7    | 24.8 | 43    | 55    | 67    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 10               | 11 | 8  | 5             | 7    | 5       | 7.5  | 26.4 | 26.0  | 32.0  | 38.0  | 5       | 6.5  | 4                | 6.5  | 25.6 | 43    | 55    | 67    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 10               | 12 | 8  | 5             | 6.5  | 5       | 7.5  | 26.4 | 26.5  | 32.5  | 38.5  | 5       | 6    | 4                | 7    | 24.8 | 44    | 56    | 68    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 11               | 12 | 8  | 5             | 6.5  | 5       | 8.5  | 25.6 | 27.0  | 33.0  | 39.0  | 5       | 6    | 4                | 6    | 24.8 | 44    | 56    | 68    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 11               | 13 | 8  | 5             | 6    | 5       | 8    | 25.6 | 27.5  | 33.5  | 39.5  | 5       | 6    | 4                | 7    | 24.8 | 45    | 57    | 69    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 12               | 13 | 8  | 5             | 6    | 5       | 8.5  | 25.6 | 28.0  | 34.0  | 40.0  | 5       | 6    | 4                | 6    | 24.8 | 45    | 57    | 69    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 12               | 14 | 8  | 6             | 8    | 5       | 8.5  | 25.6 | 28.5  | 34.5  | 40.5  | 6       | 8    | 4                | 6.5  | 24.8 | 46    | 58    | 70    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 13               | 14 | 8  | 6             | 8    | 5       | 8.5  | 24.8 | 29.0  | 35.0  | 41.0  | 6       | 8    | 4                | 6    | 24.8 | 46    | 58    | 70    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 13               | 14 | 8  | 6             | 7.5  | 5       | 8.5  | 24.8 | 29.0  | 35.0  | 41.0  | 6       | 7.5  | 5                | 9    | 24.8 | 46    | 58    | 70    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 14               | 15 | 8  | 6             | 8    | 5       | 8.5  | 24.8 | 30.0  | 36.0  | 42.0  | 6       | 7.5  | 4                | 6    | 24.8 | 47    | 59    | 71    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 14               | 15 | 8  | 6             | 7.5  | 5       | 8.5  | 24.8 | 30.0  | 36.0  | 42.0  | 6       | 7.5  | 5                | 8.5  | 24.8 | 47    | 59    | 71    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 14               | 16 | 8  | 6             | 7    | 5       | 8.5  | 24.8 | 30.5  | 36.5  | 42.5  | 6       | 7    | 4                | 6    | 24.8 | 48    | 60    | 72    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 15               | 16 | 8  | 6             | 7    | 5       | 8    | 29.6 | 31.0  | 37.0  | 43.0  | 6       | 7    | 5                | 8    | 25.6 | 48    | 60    | 72    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 15               | 16 | 8  | 6             | 7    | 5       | 8    | 29.6 | 31.0  | 37.0  | 43.0  | 6       | 7    | 5                | 8    | 24.8 | 48    | 60    | 72    | 5       | 12   | 0  |  |           |                                    |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 6 FT |                  |    |    |               |      |      |         |      |       |       |      |      |                  |      |      |         |       | HEIGHT (HT) = 8 FT OR 9 FT |      |    |  |           |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|---------------|------|------|---------|------|-------|-------|------|------|------------------|------|------|---------|-------|----------------------------|------|----|--|-----------|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |      |         |      |       |       |      |      | BOTTOM SLAB BARS |      |      |         |       |                            |      |    |  | WALL BARS |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    | A1 BARS       |      |      | J3 BARS |      |       |       |      |      | A2 BARS          |      |      | J4 BARS |       |                            |      |    |  |           |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | SIZE          | SPA. | SIZE | SPA.    | C1   | K2    |       | SIZE | SPA. | SIZE             | SPA. | C4   | K3      |       | SIZE                       | SPA. | G1 |  |           |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |               |      |      |         |      | HT=8' | HT=9' |      |      |                  |      |      | HT=8'   | HT=9' |                            |      |    |  |           |  |  |  |  |  |  |  |  |  |
| 1 FT            | 10               | 10 | 8  | 5             | 8    | 4    | 7       | 51.3 | 26.6  | 29.5  | 5    | 7    | 4                | 6.5  | 51.3 | 102     | 114   | 5                          | 12   | 12 |  |           |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 10 | 8  | 5             | 7.5  | 4    | 7       | 51.3 | 28.0  | 31.0  | 5    | 7    | 4                | 6    | 51.3 | 102     | 114   | 5                          | 12   | 12 |  |           |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 11               | 10 | 9  | 5             | 7.5  | 4    | 6.5     | 51.9 | 28.0  | 31.0  | 5    | 7    | 4                | 6    | 51.9 | 102     | 114   | 5                          | 12   | 12 |  |           |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 9  | 9  | 4             | 6    | 4    | 6.5     | 51.9 | 24.9  | 27.6  | 5    | 8    | 4                | 6.5  | 51.9 | 101     | 113   | 5                          | 12   | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 9  | 9  | 4             | 6.5  | 4    | 6.5     | 51.9 | 24.9  | 27.6  | 5    | 8.5  | 4                | 6    | 51.9 | 101     | 113   | 5                          | 12   | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 10 | 9  | 4             | 6.5  | 4    | 6       | 51.9 | 25.1  | 27.9  | 4    | 6    | 4                | 6    | 51.9 | 102     | 114   | 5                          | 11.5 | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 10 | 9  | 4             | 7.5  | 4    | 6.5     | 45.4 | 25.1  | 27.9  | 4    | 6.5  | 4                | 6.5  | 51.9 | 102     | 114   | 5                          | 12   | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 10 | 9  | 4             | 6    | 5    | 6.5     | 43.8 | 25.1  | 27.9  | 5    | 8.5  | 4                | 6    | 51.9 | 102     | 114   | 5                          | 11.5 | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 10 | 9  | 4             | 6    | 5    | 6       | 42.1 | 26.1  | 29.0  | 5    | 7.5  | 5                | 6.5  | 54.3 | 102     | 114   | 5                          | 10   | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 10 | 9  | 4             | 6    | 6    | 7       | 44.5 | 28.4  | 31.5  | 5    | 7    | 5                | 6    | 54.3 | 102     | 114   | 5                          | 9.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                | 10 | 9  | 5             | 9    | 6    | 7       | 43.8 | 29.4  | 32.6  | 5    | 7    | 6                | 7    | 55.9 | 102     | 114   | 5                          | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 20 FT           | 9                | 10 | 9  | 5             | 8.5  | 5    | 6       | 43.8 | 29.8  | 33.0  | 5    | 7    | 6                | 6.5  | 56.8 | 102     | 114   | 5                          | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 22 FT           | 9                | 11 | 9  | 5             | 8    | 5    | 6       | 42.9 | 30.0  | 33.3  | 5    | 6.5  | 6                | 6.5  | 55.9 | 103     | 115   | 5                          | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 24 FT           | 10               | 11 | 9  | 5             | 7.5  | 5    | 6       | 45.4 | 30.3  | 33.5  | 5    | 6.5  | 6                | 6    | 55.9 | 103     | 115   | 5                          | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 26 FT           | 10               | 11 | 9  | 5             | 7    | 5    | 6       | 44.5 | 30.3  | 33.5  | 5    | 6    | 6                | 6    | 55.9 | 103     | 115   | 5                          | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 28 FT           | 10               | 12 | 9  | 5             | 6.5  | 6    | 7       | 47.0 | 31.6  | 35.0  | 5    | 6    | 6                | 6    | 55.9 | 104     | 116   | 5                          | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 30 FT           | 11               | 12 | 9  | 5             | 6.5  | 6    | 6.5     | 49.4 | 35.4  | 39.0  | 5    | 6    | 6                | 6    | 55.9 | 104     | 116   | 5                          | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 32 FT           | 11               | 13 | 10 | 5             | 6.5  | 6    | 8       | 46.8 | 32.3  | 35.5  | 5    | 6    | 6                | 6.5  | 56.6 | 105     | 117   | 5                          | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 34 FT           | 12               | 13 | 11 | 5             | 6.5  | 5    | 6.5     | 44.0 | 32.5  | 35.9  | 5    | 6    | 5                | 6    | 49.8 | 105     | 117   | 5                          | 7.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 36 FT           | 12               | 13 | 11 | 5             | 6    | 5    | 6.5     | 44.0 | 32.5  | 35.9  | 6    | 8    | 6                | 7.5  | 52.3 | 105     | 117   | 5                          | 7.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 38 FT           | 12               | 14 | 12 | 5             | 6    | 5    | 6       | 42.0 | 32.8  | 36.1  | 6    | 8    | 5                | 6    | 48.8 | 106     | 118   | 5                          | 7    | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 40 FT           | 13               | 14 | 12 | 5             | 6    | 5    | 6       | 44.5 | 33.0  | 36.4  | 6    | 8    | 5                | 6    | 48.8 | 106     | 118   | 5                          | 7    | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 42 FT           | 13               | 15 | 12 | 5             | 6    | 5    | 6       | 43.6 | 33.4  | 36.6  | 6    | 7.5  | 5                | 6    | 52.1 | 107     | 119   | 5                          | 7    | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 44 FT           | 14               | 15 | 13 | 5             | 6    | 5    | 6       | 44.3 | 34.8  | 38.3  | 6    | 7.5  | 5                | 6    | 48.5 | 107     | 119   | 5                          | 6.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 46 FT           | 14               | 15 | 13 | 6             | 8    | 5    | 6       | 44.3 | 34.8  | 38.3  | 6    | 7.5  | 6                | 8    | 51.0 | 107     | 119   | 5                          | 6.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 48 FT           | 14               | 16 | 13 | 6             | 8    | 5    | 6       | 44.3 | 35.1  | 38.6  | 6    | 7    | 5                | 6    | 50.1 | 108     | 120   | 5                          | 6.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |
| 50 FT           | 15               | 16 | 13 | 6             | 8    | 5    | 6       | 51.0 | 35.4  | 38.9  | 6    | 7    | 6                | 8    | 53.5 | 108     | 120   | 5                          | 6.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 8 FT |                  |    |    |               |      |         |      |      |       |       |         |      |                  |      |      | HEIGHT (HT) = 4 FT OR 5 FT OR 6 FT |       |         |       |      |      |           |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|---------------|------|---------|------|------|-------|-------|---------|------|------------------|------|------|------------------------------------|-------|---------|-------|------|------|-----------|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       |         |      | BOTTOM SLAB BARS |      |      |                                    |       |         |       |      |      | WALL BARS |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    | A1 BARS       |      | J3 BARS |      |      |       |       | A2 BARS |      | J4 BARS          |      |      |                                    |       | B2 BARS |       |      |      |           |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |         | SIZE | SPA.             | SIZE | SPA. | C4                                 | K3    |         |       | SIZE | SPA. | G1        |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |               |      |         |      |      | HT=4' | HT=5' | HT=6'   |      |                  |      |      |                                    | HT=4' | HT=5'   | HT=6' |      |      |           |  |  |  |  |  |  |  |  |  |
| 1 FT            | 12               | 9  | 8  | 5             | 7    | 4       | 8.5  | 63.5 | 28.1  | 33.5  | 38.8    | 5    | 7.5              | 5    | 6    | 44.8                               | 53    | 65      | 77    | 5    | 12   | 1         |  |  |  |  |  |  |  |  |  |
| 2 FT            | 12               | 9  | 8  | 5             | 7    | 4       | 8    | 63.5 | 28.1  | 33.5  | 38.8    | 5    | 7                | 6    | 7.5  | 43.6                               | 53    | 65      | 77    | 5    | 12   | 12        |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 12               | 9  | 8  | 5             | 7    | 6       | 7.5  | 63.5 | 32.5  | 39.0  | 45.6    | 5    | 6.5              | 6    | 6    | 43.6                               | 53    | 65      | 77    | 5    | 12   | 12        |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 5             | 8    | 6       | 7.5  | 38.5 | 32.5  | 39.0  | 45.6    | 5    | 6.5              | 6    | 6    | 38.5                               | 52    | 64      | 76    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 5             | 8.5  | 6       | 7.5  | 37.5 | 32.5  | 39.0  | 45.6    | 5    | 7                | 6    | 6    | 36.4                               | 52    | 64      | 76    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 5             | 8    | 6       | 7.5  | 36.4 | 32.5  | 39.0  | 45.6    | 5    | 6.5              | 6    | 6    | 35.4                               | 52    | 64      | 76    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 5             | 8.5  | 6       | 7.5  | 34.4 | 32.5  | 39.0  | 45.6    | 5    | 7                | 6    | 6    | 34.4                               | 52    | 64      | 76    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 9  | 8  | 5             | 7.5  | 6       | 7.5  | 34.4 | 32.4  | 38.9  | 45.4    | 5    | 6.5              | 6    | 7.5  | 32.3                               | 53    | 65      | 77    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 9  | 8  | 5             | 6.5  | 6       | 6.5  | 34.4 | 32.4  | 38.9  | 45.4    | 6    | 8                | 6    | 7    | 32.3                               | 53    | 65      | 77    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 16 FT           | 9                | 10 | 8  | 5             | 6    | 5       | 6    | 30.1 | 29.1  | 34.8  | 40.4    | 6    | 8                | 5    | 6.5  | 28.1                               | 54    | 66      | 78    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 18 FT           | 9                | 11 | 8  | 6             | 7.5  | 6       | 7    | 33.3 | 29.6  | 35.3  | 40.9    | 6    | 7.5              | 5    | 7.5  | 27.0                               | 55    | 67      | 79    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 20 FT           | 10               | 12 | 8  | 6             | 7.5  | 5       | 6    | 29.1 | 26.0  | 30.8  | 35.6    | 6    | 7.5              | 5    | 8.5  | 26.0                               | 56    | 68      | 80    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 22 FT           | 11               | 13 | 8  | 6             | 7    | 5       | 6.5  | 28.1 | 27.5  | 32.4  | 37.3    | 6    | 7                | 5    | 8.5  | 26.0                               | 57    | 69      | 81    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 24 FT           | 12               | 13 | 8  | 6             | 7    | 5       | 7.5  | 27.0 | 32.6  | 38.4  | 44.1    | 6    | 7                | 5    | 8    | 26.0                               | 57    | 69      | 81    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 26 FT           | 13               | 14 | 8  | 6             | 7    | 5       | 8    | 27.0 | 29.4  | 34.5  | 39.5    | 6    | 7                | 5    | 8.5  | 26.0                               | 58    | 70      | 82    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 28 FT           | 13               | 15 | 8  | 6             | 6.5  | 5       | 7    | 27.0 | 29.1  | 34.0  | 39.0    | 6    | 6.5              | 5    | 8.5  | 26.0                               | 59    | 71      | 83    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 30 FT           | 14               | 15 | 8  | 6             | 6    | 5       | 7.5  | 26.0 | 30.3  | 35.3  | 40.4    | 6    | 6.5              | 5    | 8.5  | 26.0                               | 59    | 71      | 83    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 32 FT           | 15               | 16 | 8  | 6             | 6    | 5       | 7.5  | 31.3 | 35.5  | 41.3  | 47.0    | 6    | 6.5              | 5    | 8    | 26.0                               | 60    | 72      | 84    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 34 FT           | 15               | 17 | 8  | 6             | 6    | 5       | 7    | 31.3 | 31.5  | 36.5  | 41.6    | 6    | 6.5              | 5    | 7    | 26.0                               | 61    | 73      | 85    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 36 FT           | 16               | 17 | 8  | 6             | 6    | 5       | 7    | 31.3 | 32.6  | 37.9  | 43.0    | 6    | 6                | 5    | 7    | 26.0                               | 61    | 73      | 85    | 5    | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 38 FT           | 16               | 18 | 8  | 7             | 7.5  | 5       | 7    | 31.3 | 36.3  | 41.9  | 47.5    | 6    | 6                | 5    | 6.5  | 26.0                               | 62    | 74      | 86    | 5    | 11.5 | 0         |  |  |  |  |  |  |  |  |  |
| 40 FT           | 17               | 18 | 8  | 7             | 7.5  | 5       | 6.5  | 31.3 | 37.5  | 43.3  | 49.0    | 6    | 6                | 5    | 6.5  | 26.0                               | 62    | 74      | 86    | 5    | 10.5 | 0         |  |  |  |  |  |  |  |  |  |
| 42 FT           | 17               | 19 | 8  | 7             | 7    | 5       | 6.5  | 31.3 | 37.1  | 42.8  | 48.4    | 6    | 6                | 5    | 6.5  | 26.0                               | 63    | 75      | 87    | 5    | 10   | 0         |  |  |  |  |  |  |  |  |  |
| 44 FT           | 18               | 19 | 8  | 7             | 7    | 5       | 6.5  | 30.1 | 38.4  | 44.1  | 49.9    | 7    | 7.5              | 5    | 6.5  | 26.0                               | 63    | 75      | 87    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |  |  |
| 46 FT           | 18               | 20 | 8  | 7             | 7    | 5       | 6    | 31.3 | 38.1  | 43.8  | 49.4    | 7    | 7.5              | 5    | 6    | 26.0                               | 64    | 76      | 88    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |  |  |
| 48 FT           | 19               | 20 | 8  | 7             | 7    | 5       | 6    | 31.3 | 39.4  | 45.1  | 50.9    | 7    | 7.5              | 5    | 6    | 26.0                               | 64    | 76      | 88    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |  |  |
| 50 FT           | 19               | 20 | 8  | 7             | 6.5  | 5       | 6    | 31.3 | 39.4  | 45.1  | 50.9    | 7    | 7                | 6    | 7.5  | 29.1                               | 64    | 76      | 88    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 8 FT |                  |      |      |               |     |        |         |      |      |      |      |     |                  |        |      | HEIGHT (HT) = 10 FT OR 11 FT |     |   |     |    |  |           |  |  |  |  |  |
|-----------------|------------------|------|------|---------------|-----|--------|---------|------|------|------|------|-----|------------------|--------|------|------------------------------|-----|---|-----|----|--|-----------|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |      |      | TOP SLAB BARS |     |        |         |      |      |      |      |     | BOTTOM SLAB BARS |        |      |                              |     |   |     |    |  | WALL BARS |  |  |  |  |  |
|                 |                  |      |      | A1 BARS       |     |        | J3 BARS |      |      |      |      |     | A2 BARS          |        |      | J4 BARS                      |     |   |     |    |  | B2 BARS   |  |  |  |  |  |
|                 | SIZE             | SPA. | SIZE | SPA.          | C1  | K2     |         | SIZE | SPA. | SIZE | SPA. | C4  | K3               |        | SIZE | SPA.                         | G1  |   |     |    |  |           |  |  |  |  |  |
|                 |                  |      |      |               |     | HT=10' | HT=11'  |      |      |      |      |     | HT=10'           | HT=11' |      |                              |     |   |     |    |  |           |  |  |  |  |  |
| 1 FT            | 11               | 10   | 8    | 5             | 6.5 | 5      | 7.5     | 65.5 | 31.3 | 34.0 | 5    | 6.5 | 6                | 6.5    | 66.5 | 126                          | 138 | 5 | 9.5 | 12 |  |           |  |  |  |  |  |
| 2 FT            | 11               | 10   | 8    | 5             | 6.5 | 5      | 7       | 65.5 | 31.3 | 34.0 | 5    | 6   | 6                | 6      | 66.5 | 126                          | 138 | 5 | 9.5 | 12 |  |           |  |  |  |  |  |
| 2'- 4'          | 11               | 10   | 9    | 5             | 6.5 | 6      | 7       | 68.3 | 33.0 | 36.0 | 5    | 6   | 6                | 6      | 68.3 | 126                          | 138 | 5 | 8.5 | 12 |  |           |  |  |  |  |  |
| 4 FT            | 8                | 9    | 9    | 5             | 7.5 | 6      | 7       | 68.3 | 33.0 | 36.0 | 5    | 6   | 6                | 6      | 68.3 | 125                          | 137 | 5 | 8.5 | 0  |  |           |  |  |  |  |  |
| 6 FT            | 8                | 10   | 9    | 5             | 8.5 | 6      | 7       | 68.3 | 30.6 | 33.4 | 5    | 7   | 6                | 6.5    | 68.3 | 126                          | 138 | 5 | 8.5 | 0  |  |           |  |  |  |  |  |
| 8 FT            | 8                | 10   | 9    | 5             | 8   | 6      | 7       | 68.3 | 33.3 | 36.3 | 5    | 7   | 6                | 6      | 68.3 | 126                          | 138 | 5 | 8.5 | 0  |  |           |  |  |  |  |  |
| 10 FT           | 8                | 10   | 9    | 5             | 8.5 | 6      | 7       | 52.5 | 30.6 | 33.4 | 5    | 7   | 6                | 6      | 68.3 | 126                          | 138 | 5 | 8.5 | 0  |  |           |  |  |  |  |  |
| 12 FT           | 8                | 10   | 9    | 5             | 7.5 | 6      | 6.5     | 50.4 | 33.3 | 36.3 | 5    | 6.5 | 6                | 6      | 65.1 | 126                          | 138 | 5 | 8.5 | 0  |  |           |  |  |  |  |  |
| 14 FT           | 9                | 11   | 9    | 5             | 7   | 6      | 7       | 52.5 | 31.0 | 33.8 | 5    | 6.5 | 6                | 6      | 69.3 | 127                          | 139 | 5 | 8.5 | 0  |  |           |  |  |  |  |  |
| 16 FT           | 9                | 11   | 9    | 5             | 6   | 6      | 6       | 50.4 | 33.8 | 36.8 | 6    | 8   | 6                | 6      | 64.0 | 127                          | 139 | 5 | 8.5 | 0  |  |           |  |  |  |  |  |
| 18 FT           | 10               | 12   | 9    | 5             | 6   | 6      | 6       | 52.5 | 34.3 | 37.3 | 6    | 8   | 6                | 6      | 68.3 | 128                          | 140 | 5 | 8   | 0  |  |           |  |  |  |  |  |
| 20 FT           | 11               | 12   | 10   | 5             | 6   | 5      | 6       | 48.8 | 31.8 | 34.5 | 6    | 7.5 | 6                | 6.5    | 58.3 | 128                          | 140 | 5 | 8   | 0  |  |           |  |  |  |  |  |
| 22 FT           | 11               | 13   | 10   | 6             | 8   | 6      | 7       | 50.9 | 33.4 | 36.3 | 6    | 7.5 | 6                | 6.5    | 60.4 | 129                          | 141 | 5 | 7.5 | 0  |  |           |  |  |  |  |  |
| 24 FT           | 12               | 13   | 11   | 6             | 7.5 | 6      | 8       | 51.4 | 33.6 | 36.5 | 6    | 7   | 6                | 7      | 56.8 | 129                          | 141 | 5 | 7.5 | 0  |  |           |  |  |  |  |  |
| 26 FT           | 12               | 14   | 11   | 6             | 7   | 6      | 7.5     | 50.3 | 33.9 | 36.8 | 6    | 7   | 6                | 7      | 57.8 | 130                          | 142 | 5 | 7.5 | 0  |  |           |  |  |  |  |  |
| 28 FT           | 13               | 15   | 12   | 6             | 7.5 | 6      | 8       | 50.8 | 34.4 | 37.3 | 6    | 7   | 6                | 7.5    | 57.3 | 131                          | 143 | 5 | 7   | 0  |  |           |  |  |  |  |  |
| 30 FT           | 14               | 15   | 12   | 6             | 7   | 6      | 7.5     | 51.9 | 36.0 | 39.0 | 6    | 6.5 | 6                | 7      | 57.3 | 131                          | 143 | 5 | 7   | 0  |  |           |  |  |  |  |  |
| 32 FT           | 14               | 16   | 13   | 6             | 7   | 6      | 8       | 51.3 | 36.3 | 39.3 | 6    | 6.5 | 6                | 7.5    | 56.6 | 132                          | 144 | 5 | 6.5 | 0  |  |           |  |  |  |  |  |
| 34 FT           | 15               | 16   | 13   | 6             | 6.5 | 6      | 7.5     | 57.8 | 36.5 | 39.5 | 6    | 6.5 | 6                | 7      | 55.6 | 132                          | 144 | 5 | 6.5 | 0  |  |           |  |  |  |  |  |
| 36 FT           | 15               | 17   | 13   | 6             | 6.5 | 6      | 6.5     | 57.8 | 36.8 | 39.8 | 6    | 6.5 | 6                | 7      | 57.8 | 133                          | 145 | 5 | 6.5 | 0  |  |           |  |  |  |  |  |
| 38 FT           | 16               | 18   | 14   | 6             | 6.5 | 6      | 7.5     | 58.3 | 37.3 | 40.3 | 6    | 6.5 | 6                | 7.5    | 57.3 | 134                          | 146 | 5 | 6   | 0  |  |           |  |  |  |  |  |
| 40 FT           | 16               | 18   | 14   | 6             | 6   | 6      | 7       | 58.3 | 37.3 | 40.3 | 6    | 6   | 6                | 7      | 57.3 | 134                          | 146 | 5 | 6   | 0  |  |           |  |  |  |  |  |
| 42 FT           | 17               | 19   | 15   | 6             | 6   | 6      | 7       | 58.9 | 42.3 | 45.6 | 6    | 6   | 6                | 7.5    | 56.6 | 135                          | 147 | 6 | 8   | 0  |  |           |  |  |  |  |  |
| 44 FT           | 17               | 19   | 15   | 6             | 6   | 6      | 6.5     | 57.8 | 42.3 | 45.6 | 6    | 6   | 6                | 7      | 56.6 | 135                          | 147 | 6 | 8   | 0  |  |           |  |  |  |  |  |
| 46 FT           | 18               | 19   | 15   | 6             | 6   | 6      | 7       | 58.9 | 42.5 | 45.9 | 7    | 8   | 6                | 6      | 56.6 | 135                          | 147 | 6 | 8   | 0  |  |           |  |  |  |  |  |
| 48 FT           | 18               | 20   | 16   | 7             | 8   | 6      | 7       | 58.3 | 42.9 | 46.3 | 7    | 8   | 6                | 7      | 56.0 | 136                          | 148 | 6 | 8   | 0  |  |           |  |  |  |  |  |
| 50 FT           | 19               | 21   | 16   | 7             | 7.5 | 6      | 7       | 59.4 | 43.4 | 46.8 | 7    | 8   | 6                | 7      | 58.3 | 137                          | 149 | 6 | 8   | 0  |  |           |  |  |  |  |  |



| SPAN (S) = 9 FT |                     |    |    |               |      |         |      |      |       |       |         |      |                  |      |      |      |       | HEIGHT (HT) = 5 FT OR 6 FT OR 7 FT |       |      |      |           |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|---------------|------|---------|------|------|-------|-------|---------|------|------------------|------|------|------|-------|------------------------------------|-------|------|------|-----------|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       |         |      | BOTTOM SLAB BARS |      |      |      |       |                                    |       |      |      | WALL BARS |  |  |  |  |  |  |  |
|                 |                     |    |    | A1 BARS       |      | J3 BARS |      |      |       |       | A2 BARS |      | J4 BARS          |      |      |      |       | B2 BARS                            |       |      |      |           |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |         | SIZE | SPA.             | SIZE | SPA. | C4   | K3    |                                    |       | SIZE | SPA. | G1        |  |  |  |  |  |  |  |
|                 |                     |    |    |               |      |         |      |      | HT=5' | HT=6' | HT=7'   |      |                  |      |      |      | HT=5' | HT=6'                              | HT=7' |      |      |           |  |  |  |  |  |  |  |
| 1 FT            | 12                  | 9  | 8  | 5             | 6.5  | 4       | 7    | 69.6 | 28.1  | 32.5  | 37.0    | 5    | 6.5              | 6    | 7.5  | 54.5 | 65    | 77                                 | 89    | 5    | 12   | 1         |  |  |  |  |  |  |  |
| 2 FT            | 12                  | 9  | 8  | 5             | 6.5  | 4       | 7    | 69.6 | 28.1  | 32.5  | 37.0    | 5    | 6                | 6    | 7    | 48.8 | 65    | 77                                 | 89    | 5    | 12   | 12        |  |  |  |  |  |  |  |
| 2' - 4'         | 12                  | 9  | 8  | 5             | 6.5  | 6       | 7    | 69.6 | 32.4  | 37.8  | 43.3    | 5    | 6                | 6    | 7    | 48.8 | 65    | 77                                 | 89    | 5    | 12   | 12        |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 9  | 8  | 5             | 6.5  | 6       | 7    | 42.9 | 32.4  | 37.8  | 43.3    | 5    | 6                | 6    | 7.5  | 42.9 | 65    | 77                                 | 89    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 9  | 8  | 5             | 7    | 6       | 7.5  | 40.6 | 32.4  | 37.8  | 43.3    | 5    | 6                | 6    | 7    | 39.5 | 65    | 77                                 | 89    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 10 | 8  | 5             | 6.5  | 6       | 7    | 39.5 | 24.1  | 28.0  | 32.0    | 5    | 6                | 5    | 6.5  | 33.6 | 66    | 78                                 | 90    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 10 | 8  | 5             | 7    | 6       | 7.5  | 37.1 | 24.1  | 28.0  | 32.0    | 5    | 6.5              | 4    | 6    | 31.4 | 66    | 78                                 | 90    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 10 | 8  | 5             | 6    | 6       | 6    | 37.1 | 28.5  | 33.1  | 37.9    | 6    | 8                | 5    | 6.5  | 30.1 | 66    | 78                                 | 90    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 14 FT           | 9                   | 10 | 8  | 6             | 7.5  | 6       | 7    | 34.8 | 29.6  | 34.4  | 39.3    | 6    | 7                | 5    | 6    | 30.1 | 66    | 78                                 | 90    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 16 FT           | 9                   | 11 | 8  | 6             | 7    | 6       | 6    | 34.8 | 29.3  | 33.9  | 38.6    | 6    | 6.5              | 5    | 7    | 29.0 | 67    | 79                                 | 91    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 18 FT           | 10                  | 12 | 8  | 6             | 6.5  | 6       | 6.5  | 33.6 | 30.0  | 34.8  | 39.4    | 6    | 6.5              | 5    | 7.5  | 29.0 | 68    | 80                                 | 92    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 20 FT           | 11                  | 13 | 8  | 6             | 6    | 6       | 7    | 33.6 | 31.6  | 36.4  | 41.3    | 6    | 6                | 5    | 8    | 29.0 | 69    | 81                                 | 93    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 22 FT           | 12                  | 14 | 8  | 6             | 6    | 5       | 6    | 29.0 | 32.4  | 37.3  | 42.0    | 6    | 6                | 5    | 8.5  | 27.9 | 70    | 82                                 | 94    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 24 FT           | 13                  | 15 | 8  | 6             | 6    | 5       | 6    | 29.0 | 29.0  | 33.3  | 37.5    | 6    | 6                | 5    | 8.5  | 27.9 | 71    | 83                                 | 95    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 26 FT           | 14                  | 16 | 8  | 6             | 6    | 5       | 6    | 29.0 | 30.6  | 34.9  | 39.3    | 6    | 6                | 5    | 8    | 27.9 | 72    | 84                                 | 96    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 28 FT           | 15                  | 16 | 8  | 7             | 7.5  | 5       | 6.5  | 33.6 | 35.3  | 40.1  | 45.1    | 7    | 8                | 5    | 8    | 27.9 | 72    | 84                                 | 96    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 30 FT           | 15                  | 17 | 8  | 7             | 7    | 6       | 8    | 37.1 | 35.6  | 40.6  | 45.5    | 7    | 7.5              | 5    | 7    | 27.9 | 73    | 85                                 | 97    | 5    | 11.5 | 0         |  |  |  |  |  |  |  |
| 32 FT           | 16                  | 17 | 8  | 7             | 7    | 5       | 6    | 32.5 | 36.1  | 41.0  | 45.9    | 7    | 7.5              | 5    | 6.5  | 27.9 | 73    | 85                                 | 97    | 5    | 10   | 0         |  |  |  |  |  |  |  |
| 34 FT           | 17                  | 18 | 8  | 7             | 7    | 5       | 6    | 32.5 | 37.8  | 42.9  | 47.9    | 7    | 7.5              | 5    | 6.5  | 29.0 | 74    | 86                                 | 98    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |
| 36 FT           | 17                  | 19 | 9  | 7             | 7    | 5       | 6    | 33.9 | 37.3  | 42.3  | 47.1    | 7    | 7.5              | 5    | 7.5  | 29.3 | 75    | 87                                 | 99    | 5    | 10.5 | 0         |  |  |  |  |  |  |  |
| 38 FT           | 18                  | 20 | 9  | 7             | 7    | 5       | 6    | 33.9 | 38.1  | 43.0  | 48.0    | 7    | 7.5              | 5    | 7    | 29.3 | 76    | 88                                 | 100   | 5    | 9.5  | 0         |  |  |  |  |  |  |  |
| 40 FT           | 19                  | 20 | 9  | 7             | 6.5  | 5       | 6.5  | 33.9 | 39.5  | 44.5  | 49.5    | 7    | 7                | 5    | 7    | 29.3 | 76    | 88                                 | 100   | 5    | 8.5  | 0         |  |  |  |  |  |  |  |
| 42 FT           | 19                  | 21 | 10 | 7             | 6.5  | 5       | 6.5  | 34.3 | 39.9  | 45.0  | 50.0    | 7    | 7                | 5    | 7.5  | 29.5 | 77    | 89                                 | 101   | 5    | 10   | 0         |  |  |  |  |  |  |  |
| 44 FT           | 20                  | 21 | 10 | 7             | 6.5  | 5       | 6.5  | 34.3 | 40.4  | 45.4  | 50.4    | 7    | 6.5              | 5    | 7.5  | 29.5 | 77    | 89                                 | 101   | 5    | 9.5  | 0         |  |  |  |  |  |  |  |
| 46 FT           | 21                  | 22 | 10 | 7             | 6.5  | 5       | 6.5  | 34.3 | 41.1  | 46.3  | 51.3    | 7    | 7                | 5    | 7    | 29.5 | 78    | 90                                 | 102   | 5    | 8.5  | 0         |  |  |  |  |  |  |  |
| 48 FT           | 21                  | 22 | 10 | 7             | 6    | 5       | 6.5  | 34.3 | 41.1  | 46.3  | 51.3    | 7    | 6.5              | 5    | 7    | 29.5 | 78    | 90                                 | 102   | 5    | 8    | 0         |  |  |  |  |  |  |  |
| 50 FT           | 22                  | 23 | 10 | 7             | 6    | 5       | 6.5  | 34.3 | 42.0  | 47.0  | 52.1    | 7    | 6.5              | 5    | 6.5  | 30.6 | 79    | 91                                 | 103   | 5    | 8    | 0         |  |  |  |  |  |  |  |

| SPAN (S) = 9 FT |                  |    |    |               |      |      |         |      |        |        |      |      |                  |      |      |         |        | HEIGHT (HT) = 11 FT OR 12 FT |      |    |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|---------------|------|------|---------|------|--------|--------|------|------|------------------|------|------|---------|--------|------------------------------|------|----|--|-----------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |      |         |      |        |        |      |      | BOTTOM SLAB BARS |      |      |         |        |                              |      |    |  | WALL BARS |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    | A1 BARS       |      |      | J3 BARS |      |        |        |      |      | A2 BARS          |      |      | J4 BARS |        |                              |      |    |  | B2 BARS   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | SIZE          | SPA. | SIZE | SPA.    | C1   | K2     |        | SIZE | SPA. | SIZE             | SPA. | C4   | K3      |        | SIZE                         | SPA. | G1 |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |               |      |      |         |      | HT=11' | HT=12' |      |      |                  |      |      | HT=11'  | HT=12' |                              |      |    |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 11               | 11 | 8  | 5             | 6    | 5    | 6       | 70.8 | 31.3   | 33.8   | 5    | 6    | 6                | 6    | 73.1 | 139     | 151    | 5                            | 9.5  | 12 |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 12 | 8  | 6             | 8.5  | 6    | 7       | 73.1 | 33.0   | 35.6   | 5    | 6    | 6                | 6    | 73.1 | 140     | 152    | 5                            | 9.5  | 12 |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 11               | 12 | 9  | 6             | 8.5  | 6    | 6.5     | 73.8 | 33.4   | 36.1   | 6    | 8    | 6                | 6    | 73.8 | 140     | 152    | 5                            | 8.5  | 12 |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 10 | 9  | 5             | 6    | 6    | 6.5     | 73.8 | 33.4   | 36.1   | 6    | 8    | 6                | 6    | 73.8 | 138     | 150    | 5                            | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 11 | 9  | 5             | 7    | 6    | 6.5     | 73.8 | 32.1   | 34.8   | 5    | 6    | 6                | 6    | 73.8 | 139     | 151    | 5                            | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 9                | 11 | 9  | 5             | 7    | 6    | 7       | 73.8 | 30.9   | 33.4   | 5    | 6    | 6                | 6    | 73.8 | 139     | 151    | 5                            | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 9                | 11 | 9  | 5             | 7.5  | 6    | 7       | 58.5 | 30.9   | 33.4   | 5    | 6.5  | 6                | 6    | 73.8 | 139     | 151    | 5                            | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 9                | 12 | 9  | 5             | 6.5  | 6    | 6       | 56.1 | 34.0   | 36.8   | 5    | 6    | 6                | 6    | 73.8 | 140     | 152    | 5                            | 8.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 10               | 12 | 9  | 5             | 6    | 6    | 6       | 57.4 | 34.3   | 37.0   | 6    | 8    | 6                | 6    | 73.8 | 140     | 152    | 5                            | 7.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 10               | 12 | 10 | 6             | 8    | 6    | 6.5     | 53.1 | 34.3   | 37.0   | 6    | 7    | 6                | 6    | 63.8 | 140     | 152    | 5                            | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 11               | 13 | 10 | 6             | 7.5  | 6    | 6.5     | 54.3 | 36.3   | 39.1   | 6    | 7    | 6                | 6    | 64.9 | 141     | 153    | 5                            | 7.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 11               | 13 | 11 | 6             | 6.5  | 6    | 6.5     | 52.4 | 36.3   | 39.1   | 6    | 6.5  | 6                | 7    | 59.5 | 141     | 153    | 5                            | 7.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 12               | 14 | 12 | 6             | 7    | 6    | 8       | 52.8 | 33.6   | 36.3   | 6    | 6.5  | 6                | 7.5  | 58.8 | 142     | 154    | 5                            | 7    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 13               | 15 | 12 | 6             | 6.5  | 6    | 7.5     | 54.0 | 37.3   | 40.1   | 6    | 6.5  | 6                | 7    | 60.0 | 143     | 155    | 5                            | 7    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 14               | 15 | 13 | 6             | 6.5  | 6    | 7.5     | 54.5 | 35.9   | 38.6   | 6    | 6    | 6                | 6.5  | 56.9 | 143     | 155    | 5                            | 6.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 14               | 16 | 13 | 6             | 6    | 6    | 7       | 53.3 | 39.3   | 42.3   | 6    | 6    | 6                | 7    | 58.1 | 144     | 156    | 5                            | 6.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 15               | 17 | 13 | 6             | 6    | 6    | 6.5     | 60.5 | 39.8   | 42.8   | 6    | 6    | 6                | 6.5  | 60.5 | 145     | 157    | 5                            | 6.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 16               | 17 | 14 | 6             | 6    | 6    | 7       | 61.0 | 40.0   | 43.0   | 6    | 6    | 6                | 6    | 57.4 | 145     | 157    | 5                            | 6    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 16               | 18 | 14 | 7             | 8    | 6    | 6.5     | 61.0 | 40.3   | 43.3   | 7    | 7.5  | 6                | 6.5  | 58.5 | 146     | 158    | 5                            | 6    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 17               | 19 | 15 | 6             | 6    | 6    | 7       | 60.3 | 42.4   | 45.5   | 7    | 8    | 6                | 6.5  | 59.0 | 147     | 159    | 6                            | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 18               | 19 | 15 | 7             | 7.5  | 6    | 6.5     | 61.5 | 42.6   | 45.8   | 7    | 7.5  | 6                | 6.5  | 57.8 | 147     | 159    | 6                            | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 18               | 20 | 15 | 7             | 7.5  | 6    | 6       | 61.5 | 42.9   | 46.0   | 7    | 7.5  | 6                | 6.5  | 60.3 | 148     | 160    | 6                            | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 19               | 21 | 16 | 7             | 7.5  | 6    | 6.5     | 62.0 | 43.4   | 46.5   | 7    | 7.5  | 6                | 6.5  | 59.5 | 149     | 161    | 6                            | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 19               | 21 | 16 | 7             | 7    | 6    | 6       | 62.0 | 43.4   | 46.5   | 7    | 7    | 6                | 6.5  | 59.5 | 149     | 161    | 6                            | 8    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 20               | 22 | 17 | 7             | 7    | 6    | 6.5     | 62.5 | 45.6   | 48.9   | 7    | 7    | 6                | 6.5  | 58.8 | 150     | 162    | 6                            | 7.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 20               | 22 | 17 | 7             | 7    | 6    | 6       | 61.3 | 45.6   | 48.9   | 7    | 7    | 6                | 6.5  | 58.8 | 150     | 162    | 6                            | 7.5  | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 21               | 23 | 18 | 7             | 7    | 6    | 6.5     | 63.0 | 46.1   | 49.4   | 7    | 7    | 6                | 6.5  | 59.3 | 151     | 163    | 6                            | 7    | 0  |  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 10 FT |                  |    |    |               |      |         |      |      |       |       |       |      |                  |      |         |      |       |       |       |      |         |           | HEIGHT (HT) = 5 FT OR 6 FT OR 7 FT |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|---------------|------|---------|------|------|-------|-------|-------|------|------------------|------|---------|------|-------|-------|-------|------|---------|-----------|------------------------------------|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |      | BOTTOM SLAB BARS |      |         |      |       |       |       |      |         | WALL BARS |                                    |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       |      | A2 BARS          |      | J4 BARS |      |       |       |       |      | B2 BARS |           |                                    |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE | SPA.             | SIZE | SPA.    | C4   | K3    |       |       | SIZE | SPA.    | G1        |                                    |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |               |      |         |      |      | HT=5' | HT=6' | HT=7' |      |                  |      |         |      | HT=5' | HT=6' | HT=7' |      |         |           |                                    |  |  |  |  |  |  |  |  |  |
| 1 FT             | 12               | 9  | 8  | 5             | 6    | 4       | 6    | 75.5 | 28.1  | 32.5  | 37.0  | 5    | 6                | 6    | 6.5     | 52.5 | 65    | 77    | 89    | 5    | 12      | 1         |                                    |  |  |  |  |  |  |  |  |  |
| 2 FT             | 12               | 10 | 8  | 5             | 6    | 5       | 7.5  | 76.8 | 32.4  | 37.4  | 42.4  | 5    | 6                | 5    | 6.5     | 44.8 | 66    | 78    | 90    | 5    | 12      | 12        |                                    |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 12               | 10 | 8  | 6             | 8    | 7       | 6.5  | 76.8 | 32.4  | 37.8  | 43.3  | 6    | 7.5              | 6    | 7       | 44.8 | 66    | 78    | 90    | 5    | 12      | 12        |                                    |  |  |  |  |  |  |  |  |  |
| 4 FT             | 8                | 9  | 8  | 6             | 8    | 7       | 6.5  | 44.8 | 32.4  | 37.8  | 43.3  | 6    | 7.5              | 6    | 7       | 42.3 | 65    | 77    | 89    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 6 FT             | 8                | 10 | 8  | 6             | 8.5  | 6       | 6    | 42.3 | 28.5  | 33.1  | 37.9  | 6    | 7.5              | 5    | 6.5     | 35.9 | 66    | 78    | 90    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 8 FT             | 8                | 10 | 8  | 6             | 7.5  | 7       | 6    | 43.5 | 28.5  | 33.1  | 37.9  | 6    | 7                | 5    | 6.5     | 33.3 | 66    | 78    | 90    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 10 FT            | 9                | 10 | 8  | 6             | 7    | 6       | 6.5  | 38.4 | 29.6  | 34.4  | 39.3  | 6    | 6.5              | 6    | 7       | 35.9 | 66    | 78    | 90    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 12 FT            | 9                | 10 | 8  | 6             | 7.5  | 6       | 6.5  | 35.9 | 29.6  | 34.4  | 39.3  | 6    | 6.5              | 6    | 7       | 34.5 | 66    | 78    | 90    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 14 FT            | 9                | 11 | 8  | 6             | 6.5  | 7       | 6    | 39.6 | 29.3  | 33.9  | 38.6  | 6    | 6                | 5    | 7       | 29.5 | 67    | 79    | 91    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 16 FT            | 10               | 12 | 8  | 6             | 6    | 6       | 6    | 34.5 | 30.0  | 34.8  | 39.4  | 6    | 6                | 5    | 7.5     | 28.1 | 68    | 80    | 92    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 18 FT            | 11               | 13 | 8  | 7             | 7.5  | 6       | 6.5  | 33.3 | 31.6  | 36.4  | 41.3  | 7    | 7.5              | 5    | 8       | 28.1 | 69    | 81    | 93    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 20 FT            | 12               | 14 | 8  | 7             | 7.5  | 6       | 7    | 33.3 | 32.4  | 37.3  | 42.0  | 7    | 7.5              | 5    | 8.5     | 26.9 | 70    | 82    | 94    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 22 FT            | 13               | 15 | 8  | 7             | 7    | 6       | 7.5  | 32.0 | 33.3  | 38.0  | 42.8  | 7    | 7.5              | 5    | 8.5     | 26.9 | 71    | 83    | 95    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 24 FT            | 14               | 16 | 8  | 7             | 7    | 6       | 8    | 30.8 | 34.0  | 38.8  | 43.6  | 7    | 7.5              | 5    | 8       | 26.9 | 72    | 84    | 96    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 26 FT            | 15               | 17 | 8  | 7             | 6.5  | 6       | 8    | 37.1 | 35.6  | 40.6  | 45.5  | 7    | 7                | 5    | 7       | 26.9 | 73    | 85    | 97    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 28 FT            | 16               | 18 | 8  | 7             | 6.5  | 6       | 8.5  | 35.9 | 36.5  | 41.4  | 46.4  | 7    | 7                | 5    | 6.5     | 26.9 | 74    | 86    | 98    | 5    | 12      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 30 FT            | 17               | 18 | 8  | 7             | 6.5  | 5       | 6    | 32.0 | 37.8  | 42.9  | 47.9  | 7    | 6.5              | 5    | 6.5     | 26.9 | 74    | 86    | 98    | 5    | 11.5    | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 32 FT            | 18               | 19 | 8  | 7             | 6.5  | 5       | 6    | 32.0 | 38.6  | 43.6  | 48.8  | 7    | 6.5              | 5    | 6.5     | 26.9 | 75    | 87    | 99    | 5    | 10      | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 34 FT            | 18               | 20 | 8  | 7             | 6    | 6       | 7.5  | 35.9 | 38.1  | 43.0  | 48.0  | 7    | 6.5              | 5    | 6       | 26.9 | 76    | 88    | 100   | 5    | 9.5     | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 36 FT            | 19               | 21 | 8  | 7             | 6    | 6       | 7.5  | 35.9 | 39.9  | 45.0  | 50.0  | 7    | 6.5              | 6    | 7.5     | 30.8 | 77    | 89    | 101   | 5    | 9.5     | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 38 FT            | 20               | 21 | 8  | 7             | 6    | 6       | 7.5  | 35.9 | 44.1  | 49.6  | 55.3  | 7    | 6.5              | 6    | 7.5     | 30.8 | 77    | 89    | 101   | 5    | 9.5     | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 40 FT            | 21               | 22 | 8  | 7             | 6    | 6       | 7    | 35.9 | 45.1  | 50.6  | 56.1  | 7    | 6.5              | 6    | 7       | 30.8 | 78    | 90    | 102   | 5    | 9       | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 42 FT            | 21               | 23 | 9  | 8             | 7.5  | 5       | 6    | 33.5 | 41.6  | 46.6  | 51.6  | 7    | 6                | 5    | 6       | 28.4 | 79    | 91    | 103   | 5    | 8.5     | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 44 FT            | 22               | 23 | 9  | 8             | 7.5  | 6       | 7.5  | 37.4 | 42.0  | 47.0  | 52.1  | 7    | 6                | 5    | 6       | 28.4 | 79    | 91    | 103   | 5    | 8.5     | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 46 FT            | 23               | 24 | 10 | 8             | 7.5  | 5       | 6.5  | 33.8 | 43.9  | 49.0  | 54.1  | 7    | 6                | 5    | 6.5     | 28.6 | 80    | 92    | 104   | 5    | 8.5     | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 48 FT            | 23               | 25 | 10 | 8             | 7    | 5       | 6    | 33.8 | 43.3  | 48.3  | 53.4  | 7    | 6                | 5    | 6       | 28.6 | 81    | 93    | 105   | 5    | 8       | 0         |                                    |  |  |  |  |  |  |  |  |  |
| 50 FT            | 24               | 25 | 10 | 8             | 7    | 5       | 6    | 33.8 | 44.8  | 49.9  | 55.0  | 7    | 6                | 5    | 6       | 28.6 | 81    | 93    | 105   | 5    | 8       | 0         |                                    |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 10 FT |                  |    |    |               |      |      |         |      |        |        |        |      |                  |      |      |         |        |        | HEIGHT (HT) = 11 FT OR 12 FT OR 13 FT |      |      |           |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|---------------|------|------|---------|------|--------|--------|--------|------|------------------|------|------|---------|--------|--------|---------------------------------------|------|------|-----------|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |      |         |      |        |        |        |      | BOTTOM SLAB BARS |      |      |         |        |        |                                       |      |      | WALL BARS |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    | A1 BARS       |      |      | J3 BARS |      |        |        |        |      | A2 BARS          |      |      | J4 BARS |        |        |                                       |      |      |           |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE | SPA.    | C1   | K2     |        |        | SIZE | SPA.             | SIZE | SPA. | C4      | K3     |        |                                       | SIZE | SPA. | G1        |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |               |      |      |         |      | HT=11' | HT=12' | HT=13' |      |                  |      |      |         | HT=11' | HT=12' | HT=13'                                |      |      |           |  |  |  |  |  |  |  |  |  |
| 1 FT             | 11               | 11 | 9  | 6             | 8    | 6    | 7.5     | 80.0 | 31.3   | 33.8   | 36.4   | 6    | 7.5              | 6    | 6    | 80.0    | 139    | 151    | 163                                   | 5    | 8.5  | 12        |  |  |  |  |  |  |  |  |  |
| 2 FT             | 11               | 11 | 9  | 6             | 7.5  | 6    | 7       | 80.0 | 35.8   | 38.6   | 41.5   | 6    | 7.5              | 6    | 6    | 80.0    | 139    | 151    | 163                                   | 5    | 8.5  | 12        |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 11               | 11 | 9  | 6             | 7.5  | 6    | 6.5     | 80.0 | 35.8   | 38.6   | 41.5   | 6    | 7.5              | 6    | 6    | 80.0    | 139    | 151    | 163                                   | 5    | 8    | 12        |  |  |  |  |  |  |  |  |  |
| 4 FT             | 9                | 11 | 9  | 6             | 8    | 6    | 6.5     | 80.0 | 33.8   | 36.6   | 39.4   | 6    | 7.5              | 6    | 6    | 80.0    | 139    | 151    | 163                                   | 5    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 6 FT             | 9                | 12 | 9  | 5             | 6    | 6    | 6       | 80.0 | 31.1   | 33.6   | 36.1   | 6    | 7.5              | 6    | 6    | 80.0    | 140    | 152    | 164                                   | 5    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 8 FT             | 9                | 12 | 10 | 5             | 6    | 6    | 6.5     | 75.4 | 31.1   | 33.6   | 36.1   | 6    | 7.5              | 6    | 6.5  | 80.6    | 140    | 152    | 164                                   | 5    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 10 FT            | 10               | 12 | 10 | 6             | 8    | 6    | 6.5     | 74.1 | 32.8   | 35.4   | 38.0   | 6    | 7                | 6    | 6    | 80.6    | 140    | 152    | 164                                   | 5    | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 12 FT            | 10               | 12 | 10 | 6             | 8.5  | 6    | 6.5     | 58.5 | 32.8   | 35.4   | 38.0   | 6    | 7.5              | 6    | 6    | 71.5    | 140    | 152    | 164                                   | 5    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 14 FT            | 10               | 13 | 10 | 6             | 7.5  | 6    | 6       | 57.3 | 31.5   | 34.0   | 36.5   | 6    | 7                | 6    | 6    | 74.1    | 141    | 153    | 165                                   | 5    | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 16 FT            | 11               | 13 | 11 | 6             | 7    | 6    | 6.5     | 56.4 | 33.3   | 35.9   | 38.5   | 6    | 6.5              | 6    | 6.5  | 65.5    | 141    | 153    | 165                                   | 5    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 18 FT            | 12               | 14 | 12 | 6             | 7    | 6    | 7.5     | 56.8 | 33.6   | 36.3   | 39.0   | 6    | 6.5              | 6    | 7.5  | 63.4    | 142    | 154    | 166                                   | 5    | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 20 FT            | 13               | 15 | 12 | 6             | 6.5  | 6    | 7       | 56.8 | 35.6   | 38.4   | 41.1   | 6    | 6                | 6    | 7    | 64.6    | 143    | 155    | 167                                   | 5    | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 22 FT            | 13               | 15 | 13 | 6             | 6    | 6    | 7       | 55.9 | 35.6   | 38.4   | 41.1   | 7    | 8                | 6    | 7    | 61.1    | 143    | 155    | 167                                   | 5    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 24 FT            | 14               | 16 | 13 | 6             | 6    | 6    | 6.5     | 57.3 | 36.1   | 38.9   | 41.6   | 7    | 7.5              | 6    | 7    | 61.1    | 144    | 156    | 168                                   | 5    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 26 FT            | 15               | 17 | 13 | 7             | 8    | 6    | 6       | 63.9 | 36.6   | 39.4   | 42.1   | 7    | 7.5              | 6    | 6    | 62.5    | 145    | 157    | 169                                   | 5    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 28 FT            | 16               | 18 | 14 | 7             | 8    | 6    | 6.5     | 63.0 | 38.6   | 41.5   | 44.4   | 7    | 7.5              | 6    | 6.5  | 61.6    | 146    | 158    | 170                                   | 5    | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 30 FT            | 16               | 18 | 14 | 7             | 7    | 6    | 6       | 63.0 | 40.3   | 43.3   | 46.3   | 7    | 7                | 6    | 6    | 61.6    | 146    | 158    | 170                                   | 5    | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 32 FT            | 17               | 19 | 15 | 7             | 7    | 6    | 6       | 63.5 | 42.4   | 45.5   | 48.6   | 7    | 7                | 6    | 6    | 60.8    | 147    | 159    | 171                                   | 6    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 34 FT            | 18               | 20 | 15 | 7             | 7    | 6    | 6       | 63.5 | 42.9   | 46.0   | 49.1   | 7    | 7                | 6    | 6    | 62.1    | 148    | 160    | 172                                   | 6    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 36 FT            | 19               | 21 | 16 | 7             | 7    | 6    | 6       | 63.9 | 43.4   | 46.5   | 49.6   | 7    | 7                | 6    | 6    | 62.5    | 149    | 161    | 173                                   | 6    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 38 FT            | 19               | 21 | 16 | 7             | 6.5  | 7    | 7.5     | 69.4 | 43.4   | 46.5   | 49.6   | 7    | 6.5              | 6    | 6    | 61.3    | 149    | 161    | 173                                   | 6    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 40 FT            | 20               | 22 | 17 | 7             | 6.5  | 6    | 6       | 64.4 | 45.6   | 48.9   | 52.1   | 7    | 6.5              | 6    | 6    | 61.6    | 150    | 162    | 174                                   | 6    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 42 FT            | 21               | 23 | 17 | 7             | 6.5  | 7    | 7.5     | 69.9 | 46.1   | 49.4   | 52.6   | 7    | 6.5              | 6    | 6    | 63.0    | 151    | 163    | 175                                   | 6    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 44 FT            | 21               | 23 | 18 | 7             | 6.5  | 6    | 6       | 64.9 | 46.1   | 49.4   | 52.6   | 7    | 6.5              | 6    | 6    | 62.1    | 151    | 163    | 175                                   | 6    | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 46 FT            | 22               | 24 | 19 | 7             | 6.5  | 6    | 6       | 65.4 | 46.8   | 50.0   | 53.3   | 7    | 6.5              | 6    | 6    | 62.5    | 152    | 164    | 176                                   | 6    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 48 FT            | 23               | 25 | 19 | 7             | 6    | 6    | 6       | 65.4 | 47.3   | 50.5   | 53.8   | 7    | 6                | 6    | 6    | 62.5    | 153    | 165    | 177                                   | 6    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 50 FT            | 23               | 25 | 20 | 7             | 6    | 6    | 6       | 65.8 | 47.3   | 50.5   | 53.8   | 7    | 6                | 6    | 6    | 63.0    | 153    | 165    | 177                                   | 6    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 10 FT |                     |    |    |               |      |         |      |      |       |       |        |      |                  |      |         |      |       |       |        | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |      |           |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|---------------|------|---------|------|------|-------|-------|--------|------|------------------|------|---------|------|-------|-------|--------|-------------------------------------|------|-----------|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       |        |      | BOTTOM SLAB BARS |      |         |      |       |       |        |                                     |      | WALL BARS |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |        |      | A2 BARS          |      | J4 BARS |      |       |       |        |                                     |      | B2 BARS   |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |        | SIZE | SPA.             | SIZE | SPA.    | C4   | K3    |       |        | SIZE                                | SPA. | G1        |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |               |      |         |      |      | HT=8' | HT=9' | HT=10' |      |                  |      |         |      | HT=8' | HT=9' | HT=10' |                                     |      |           |  |  |  |  |  |  |  |  |  |
| 1 FT             | 12                  | 11 | 8  | 5             | 6    | 5       | 8    | 76.8 | 33.0  | 36.5  | 40.0   | 5    | 6                | 5    | 6       | 76.8 | 103   | 115   | 127    | 5                                   | 12   | 12        |  |  |  |  |  |  |  |  |  |
| 2 FT             | 12                  | 11 | 8  | 6             | 8    | 5       | 7    | 76.8 | 33.0  | 36.5  | 40.0   | 6    | 8                | 6    | 7.5     | 79.4 | 103   | 115   | 127    | 5                                   | 11.5 | 12        |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 12                  | 11 | 9  | 6             | 8    | 6       | 6    | 76.8 | 33.0  | 36.5  | 40.0   | 6    | 7.5              | 6    | 7       | 79.4 | 103   | 115   | 127    | 5                                   | 11.5 | 12        |  |  |  |  |  |  |  |  |  |
| 4 FT             | 8                   | 10 | 9  | 6             | 8    | 6       | 6    | 59.4 | 28.4  | 31.5  | 34.6   | 6    | 7.5              | 6    | 7       | 68.4 | 102   | 114   | 126    | 5                                   | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 6 FT             | 8                   | 10 | 9  | 6             | 8    | 6       | 6    | 51.6 | 32.8  | 36.3  | 39.9   | 6    | 7.5              | 6    | 6.5     | 56.8 | 102   | 114   | 126    | 5                                   | 11.5 | 0         |  |  |  |  |  |  |  |  |  |
| 8 FT             | 9                   | 10 | 9  | 6             | 8    | 6       | 7    | 49.0 | 33.0  | 36.6  | 40.3   | 6    | 7                | 6    | 6       | 51.6 | 102   | 114   | 126    | 5                                   | 11.5 | 0         |  |  |  |  |  |  |  |  |  |
| 10 FT            | 9                   | 11 | 9  | 6             | 7.5  | 6       | 6    | 47.8 | 30.0  | 33.3  | 36.5   | 6    | 7                | 6    | 6.5     | 49.0 | 103   | 115   | 127    | 5                                   | 11   | 0         |  |  |  |  |  |  |  |  |  |
| 12 FT            | 9                   | 11 | 9  | 6             | 7.5  | 6       | 6.5  | 43.9 | 30.0  | 33.3  | 36.5   | 6    | 7                | 6    | 6.5     | 43.9 | 103   | 115   | 127    | 5                                   | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 14 FT            | 10                  | 11 | 9  | 6             | 7    | 6       | 6.5  | 42.6 | 31.4  | 34.8  | 38.1   | 6    | 6                | 6    | 6       | 43.9 | 103   | 115   | 127    | 5                                   | 12   | 0         |  |  |  |  |  |  |  |  |  |
| 16 FT            | 10                  | 12 | 9  | 6             | 6    | 6       | 6    | 42.6 | 30.5  | 33.8  | 37.0   | 7    | 8                | 6    | 6.5     | 42.6 | 104   | 116   | 128    | 5                                   | 10.5 | 0         |  |  |  |  |  |  |  |  |  |
| 18 FT            | 11                  | 13 | 9  | 6             | 6    | 6       | 6    | 42.6 | 31.0  | 34.3  | 37.5   | 7    | 7.5              | 6    | 6.5     | 42.6 | 105   | 117   | 129    | 5                                   | 9.5  | 0         |  |  |  |  |  |  |  |  |  |
| 20 FT            | 12                  | 14 | 9  | 7             | 7.5  | 6       | 6.5  | 41.3 | 32.8  | 36.1  | 39.5   | 7    | 7.5              | 6    | 6.5     | 42.6 | 106   | 118   | 130    | 5                                   | 8.5  | 0         |  |  |  |  |  |  |  |  |  |
| 22 FT            | 13                  | 15 | 9  | 7             | 7.5  | 6       | 6    | 41.3 | 33.4  | 36.6  | 40.0   | 7    | 7.5              | 6    | 6.5     | 42.6 | 107   | 119   | 131    | 5                                   | 8.5  | 0         |  |  |  |  |  |  |  |  |  |
| 24 FT            | 14                  | 16 | 10 | 7             | 7.5  | 6       | 7    | 41.6 | 35.1  | 38.6  | 42.0   | 7    | 7.5              | 6    | 8       | 42.9 | 108   | 120   | 132    | 5                                   | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 26 FT            | 15                  | 17 | 11 | 7             | 7.5  | 6       | 7    | 48.5 | 35.6  | 39.1  | 42.6   | 7    | 7.5              | 5    | 6       | 40.6 | 109   | 121   | 133    | 5                                   | 8.5  | 0         |  |  |  |  |  |  |  |  |  |
| 28 FT            | 16                  | 18 | 11 | 7             | 7    | 6       | 7    | 48.5 | 36.3  | 39.8  | 43.3   | 7    | 7.5              | 5    | 6       | 40.6 | 110   | 122   | 134    | 5                                   | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 30 FT            | 17                  | 19 | 12 | 7             | 7    | 6       | 7.5  | 48.9 | 38.1  | 41.8  | 45.3   | 7    | 7                | 5    | 6       | 40.9 | 111   | 123   | 135    | 5                                   | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 32 FT            | 17                  | 19 | 12 | 7             | 6.5  | 6       | 7    | 48.9 | 38.1  | 41.8  | 45.3   | 7    | 7                | 5    | 6       | 40.9 | 111   | 123   | 135    | 5                                   | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 34 FT            | 18                  | 20 | 12 | 7             | 6.5  | 6       | 7    | 48.9 | 38.8  | 42.3  | 45.9   | 7    | 6.5              | 6    | 8.5     | 43.5 | 112   | 124   | 136    | 5                                   | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 36 FT            | 19                  | 21 | 12 | 7             | 6.5  | 6       | 6    | 48.9 | 39.3  | 42.9  | 46.5   | 7    | 6.5              | 6    | 8       | 43.5 | 113   | 125   | 137    | 5                                   | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 38 FT            | 19                  | 21 | 13 | 7             | 6    | 6       | 6    | 49.3 | 39.3  | 42.9  | 46.5   | 7    | 6.5              | 6    | 8       | 43.9 | 113   | 125   | 137    | 5                                   | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 40 FT            | 20                  | 22 | 13 | 7             | 6    | 6       | 6.5  | 49.3 | 41.3  | 45.0  | 48.6   | 7    | 6.5              | 6    | 8       | 43.9 | 114   | 126   | 138    | 5                                   | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 42 FT            | 21                  | 23 | 13 | 7             | 6    | 6       | 6    | 49.3 | 41.9  | 45.6  | 49.3   | 7    | 6.5              | 6    | 8       | 43.9 | 115   | 127   | 139    | 5                                   | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 44 FT            | 21                  | 23 | 14 | 7             | 6    | 6       | 6    | 49.6 | 41.9  | 45.6  | 49.3   | 7    | 6                | 6    | 7.5     | 44.3 | 115   | 127   | 139    | 5                                   | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 46 FT            | 22                  | 24 | 14 | 7             | 6    | 6       | 6.5  | 49.6 | 42.5  | 46.3  | 49.9   | 7    | 6                | 6    | 8       | 45.5 | 116   | 128   | 140    | 5                                   | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 48 FT            | 23                  | 25 | 14 | 8             | 7.5  | 6       | 6.5  | 49.6 | 43.1  | 46.8  | 50.5   | 7    | 6                | 6    | 8       | 45.5 | 117   | 129   | 141    | 5                                   | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 50 FT            | 23                  | 25 | 14 | 8             | 7    | 6       | 6    | 49.6 | 43.1  | 46.8  | 50.5   | 7    | 6                | 6    | 7.5     | 45.5 | 117   | 129   | 141    | 5                                   | 6    | 0         |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 11 FT |                  |    |    |               |      |         |      |      |       |       |       |         |      |                  |      |      |       |       |       |         |      |    | HEIGHT (HT) = 6 FT OR 7 FT OR 8 FT |           |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------------------|------|------|-------|-------|-------|---------|------|----|------------------------------------|-----------|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      | BOTTOM SLAB BARS |      |      |       |       |       |         |      |    |                                    | WALL BARS |  |  |  |  |  |  |  |  |
|                  |                  |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | A2 BARS |      | J4 BARS          |      |      |       |       |       | B2 BARS |      |    |                                    |           |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | SIZE             | SPA. | C4   | K3    |       |       | SIZE    | SPA. | G1 |                                    |           |  |  |  |  |  |  |  |  |
|                  |                  |    |    |               |      |         |      |      | HT=6' | HT=7' | HT=8' |         |      |                  |      |      | HT=6' | HT=7' | HT=8' |         |      |    |                                    |           |  |  |  |  |  |  |  |  |
| 1 FT             | 12               | 10 | 8  | 6             | 7.5  | 5       | 7    | 82.6 | 32.0  | 36.4  | 40.6  | 6       | 8    | 6                | 7.5  | 61.6 | 78    | 90    | 102   | 5       | 12   | 1  |                                    |           |  |  |  |  |  |  |  |  |
| 2 FT             | 12               | 10 | 8  | 6             | 7.5  | 5       | 6.5  | 82.6 | 32.0  | 36.4  | 40.6  | 6       | 7.5  | 6                | 7    | 53.3 | 78    | 90    | 102   | 5       | 12   | 12 |                                    |           |  |  |  |  |  |  |  |  |
| 2' - 4'          | 12               | 10 | 8  | 6             | 7    | 6       | 6.5  | 82.6 | 32.0  | 36.4  | 40.6  | 6       | 7    | 6                | 7    | 53.3 | 78    | 90    | 102   | 5       | 12   | 12 |                                    |           |  |  |  |  |  |  |  |  |
| 4 FT             | 9                | 10 | 8  | 6             | 7    | 6       | 6.5  | 46.3 | 29.3  | 33.4  | 37.4  | 6       | 7    | 6                | 7.5  | 46.3 | 78    | 90    | 102   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 6 FT             | 9                | 10 | 8  | 6             | 7    | 6       | 6.5  | 43.4 | 29.3  | 33.4  | 37.4  | 6       | 6.5  | 6                | 6.5  | 42.0 | 78    | 90    | 102   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 8 FT             | 9                | 10 | 8  | 6             | 6.5  | 6       | 6    | 42.0 | 33.5  | 38.3  | 42.9  | 6       | 6    | 6                | 6    | 40.6 | 78    | 90    | 102   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 10 FT            | 10               | 11 | 8  | 6             | 6.5  | 6       | 6.5  | 39.3 | 30.8  | 35.0  | 39.3  | 7       | 8    | 6                | 7    | 37.8 | 79    | 91    | 103   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 12 FT            | 10               | 11 | 8  | 6             | 6.5  | 6       | 6.5  | 37.8 | 30.8  | 35.0  | 39.3  | 6       | 6    | 6                | 7    | 35.0 | 79    | 91    | 103   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 14 FT            | 10               | 11 | 8  | 7             | 7.5  | 6       | 6    | 36.4 | 34.4  | 39.0  | 43.6  | 7       | 7    | 6                | 6    | 35.0 | 79    | 91    | 103   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 16 FT            | 11               | 13 | 8  | 7             | 7    | 6       | 6    | 36.4 | 31.9  | 36.0  | 40.3  | 7       | 7    | 5                | 6.5  | 30.8 | 81    | 93    | 105   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 18 FT            | 11               | 14 | 8  | 7             | 6    | 7       | 6    | 39.3 | 31.3  | 35.4  | 39.5  | 7       | 6.5  | 5                | 7    | 29.4 | 82    | 94    | 106   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 20 FT            | 13               | 15 | 8  | 7             | 6.5  | 6       | 6.5  | 33.6 | 33.3  | 37.5  | 41.6  | 7       | 6.5  | 5                | 7    | 29.4 | 83    | 95    | 107   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 22 FT            | 14               | 16 | 8  | 7             | 6    | 6       | 6.5  | 33.6 | 34.9  | 39.3  | 43.5  | 7       | 6.5  | 5                | 7    | 29.4 | 84    | 96    | 108   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 24 FT            | 15               | 17 | 8  | 7             | 6    | 6       | 6.5  | 39.3 | 35.6  | 40.0  | 44.3  | 7       | 6.5  | 5                | 6.5  | 29.4 | 85    | 97    | 109   | 5       | 12   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 26 FT            | 16               | 18 | 8  | 7             | 6    | 6       | 6.5  | 37.8 | 36.4  | 40.6  | 45.0  | 7       | 6.5  | 5                | 6.5  | 29.4 | 86    | 98    | 110   | 5       | 10   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 28 FT            | 17               | 19 | 8  | 8             | 7.5  | 6       | 6.5  | 37.8 | 37.1  | 41.4  | 45.8  | 7       | 6    | 5                | 6.5  | 29.4 | 87    | 99    | 111   | 5       | 9.5  | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 30 FT            | 18               | 20 | 8  | 8             | 7.5  | 6       | 6    | 37.8 | 38.9  | 43.3  | 47.8  | 7       | 6    | 5                | 6    | 29.4 | 88    | 100   | 112   | 5       | 9.5  | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 32 FT            | 19               | 21 | 9  | 8             | 7.5  | 6       | 7    | 39.5 | 39.6  | 44.0  | 48.5  | 7       | 6    | 5                | 6.5  | 29.6 | 89    | 101   | 113   | 5       | 9    | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 34 FT            | 20               | 22 | 10 | 8             | 7.5  | 6       | 8    | 39.8 | 40.4  | 44.8  | 49.3  | 7       | 6    | 5                | 7    | 31.3 | 90    | 102   | 114   | 5       | 10   | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 36 FT            | 21               | 23 | 10 | 8             | 7.5  | 6       | 8    | 39.8 | 41.1  | 45.5  | 50.0  | 7       | 6    | 5                | 6.5  | 31.3 | 91    | 103   | 115   | 5       | 9    | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 38 FT            | 22               | 23 | 10 | 8             | 7    | 6       | 8    | 39.8 | 42.5  | 47.1  | 51.6  | 8       | 7.5  | 5                | 6.5  | 31.3 | 91    | 103   | 115   | 5       | 8    | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 40 FT            | 22               | 24 | 11 | 8             | 7    | 6       | 7    | 40.0 | 43.0  | 47.5  | 52.0  | 8       | 7.5  | 5                | 7    | 31.5 | 92    | 104   | 116   | 5       | 9    | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 42 FT            | 23               | 25 | 11 | 8             | 7    | 6       | 8    | 40.0 | 43.8  | 48.3  | 52.9  | 8       | 7.5  | 5                | 7    | 31.5 | 93    | 105   | 117   | 5       | 8.5  | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 44 FT            | 24               | 26 | 11 | 8             | 7    | 6       | 8    | 40.0 | 44.5  | 49.0  | 53.6  | 8       | 7.5  | 5                | 6.5  | 31.5 | 94    | 106   | 118   | 5       | 7.5  | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 46 FT            | 25               | 26 | 11 | 8             | 6.5  | 6       | 8    | 40.0 | 46.0  | 50.8  | 55.4  | 8       | 7    | 5                | 6.5  | 31.5 | 94    | 106   | 118   | 5       | 7.5  | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 48 FT            | 25               | 27 | 11 | 8             | 6.5  | 6       | 7.5  | 40.0 | 45.3  | 49.8  | 54.4  | 8       | 7    | 5                | 6    | 31.5 | 95    | 107   | 119   | 5       | 7.5  | 0  |                                    |           |  |  |  |  |  |  |  |  |
| 50 FT            | 26               | 27 | 11 | 8             | 6.5  | 6       | 8    | 40.0 | 46.8  | 51.5  | 56.1  | 8       | 7    | 5                | 6    | 31.5 | 95    | 107   | 119   | 5       | 7.5  | 0  |                                    |           |  |  |  |  |  |  |  |  |

| SPAN (S) = 11 FT |                  |      |      |               |     |        |         |        |      |      |      |      |                  |        |        |         |      | HEIGHT (HT) = 12 FT OR 13 FT OR 14 FT |     |   |     |           |  |  |  |  |  |  |  |
|------------------|------------------|------|------|---------------|-----|--------|---------|--------|------|------|------|------|------------------|--------|--------|---------|------|---------------------------------------|-----|---|-----|-----------|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      | TOP SLAB BARS |     |        |         |        |      |      |      |      | BOTTOM SLAB BARS |        |        |         |      |                                       |     |   |     | WALL BARS |  |  |  |  |  |  |  |
|                  |                  |      |      | A1 BARS       |     |        | J3 BARS |        |      |      |      |      | A2 BARS          |        |        | J4 BARS |      |                                       |     |   |     |           |  |  |  |  |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA.          | C1  | K2     |         |        | SIZE | SPA. | SIZE | SPA. | C4               | K3     |        |         | SIZE | SPA.                                  | G1  |   |     |           |  |  |  |  |  |  |  |
|                  |                  |      |      |               |     | HT=12' | HT=13'  | HT=14' |      |      |      |      |                  | HT=12' | HT=13' | HT=14'  |      |                                       |     |   |     |           |  |  |  |  |  |  |  |
| 1 FT             | 12               | 12   | 9    | 6             | 7.5 | 6      | 7       | 86.0   | 32.6 | 35.0 | 37.4 | 6    | 7.5              | 6      | 6      | 86.0    | 152  | 164                                   | 176 | 5 | 8.5 | 12        |  |  |  |  |  |  |  |
| 2 FT             | 12               | 12   | 9    | 6             | 7   | 6      | 6.5     | 86.0   | 34.3 | 36.8 | 39.3 | 6    | 7                | 6      | 6      | 86.0    | 152  | 164                                   | 176 | 5 | 8   | 12        |  |  |  |  |  |  |  |
| 2'- 4'           | 12               | 12   | 10   | 6             | 7   | 6      | 6       | 86.6   | 34.3 | 36.8 | 39.3 | 6    | 6.5              | 6      | 6      | 86.6    | 152  | 164                                   | 176 | 5 | 7.5 | 12        |  |  |  |  |  |  |  |
| 4 FT             | 9                | 11   | 10   | 6             | 7   | 6      | 6       | 86.6   | 33.4 | 35.9 | 38.4 | 6    | 6.5              | 6      | 6      | 86.6    | 151  | 163                                   | 175 | 5 | 7.5 | 0         |  |  |  |  |  |  |  |
| 6 FT             | 9                | 12   | 10   | 6             | 7.5 | 6      | 6       | 86.6   | 33.6 | 36.1 | 38.6 | 6    | 6.5              | 6      | 6      | 88.0    | 152  | 164                                   | 176 | 5 | 7   | 0         |  |  |  |  |  |  |  |
| 8 FT             | 10               | 13   | 10   | 6             | 7.5 | 6      | 6       | 86.6   | 34.0 | 36.5 | 39.0 | 6    | 7                | 6      | 6      | 86.6    | 153  | 165                                   | 177 | 5 | 6.5 | 0         |  |  |  |  |  |  |  |
| 10 FT            | 10               | 13   | 11   | 6             | 7   | 6      | 6       | 70.1   | 34.0 | 36.5 | 39.0 | 6    | 6.5              | 6      | 6.5    | 88.6    | 153  | 165                                   | 177 | 5 | 6.5 | 0         |  |  |  |  |  |  |  |
| 12 FT            | 10               | 13   | 11   | 6             | 7.5 | 6      | 6       | 60.0   | 32.4 | 34.8 | 37.3 | 6    | 6.5              | 6      | 6.5    | 74.4    | 153  | 165                                   | 177 | 5 | 7.5 | 0         |  |  |  |  |  |  |  |
| 14 FT            | 11               | 13   | 11   | 6             | 6.5 | 6      | 6       | 60.0   | 35.9 | 38.5 | 41.1 | 6    | 6                | 6      | 6      | 70.1    | 153  | 165                                   | 177 | 5 | 7   | 0         |  |  |  |  |  |  |  |
| 16 FT            | 12               | 14   | 12   | 6             | 6.5 | 6      | 7       | 60.5   | 36.3 | 39.0 | 41.6 | 7    | 8                | 6      | 6.5    | 67.6    | 154  | 166                                   | 178 | 5 | 7   | 0         |  |  |  |  |  |  |  |
| 18 FT            | 13               | 15   | 13   | 6             | 6   | 6      | 7       | 59.5   | 38.4 | 41.1 | 43.9 | 7    | 7.5              | 6      | 7      | 65.3    | 155  | 167                                   | 179 | 5 | 6.5 | 0         |  |  |  |  |  |  |  |
| 20 FT            | 14               | 16   | 13   | 6             | 6   | 6      | 6.5     | 60.9   | 38.9 | 41.6 | 44.4 | 7    | 7.5              | 6      | 6.5    | 66.8    | 156  | 168                                   | 180 | 5 | 6.5 | 0         |  |  |  |  |  |  |  |
| 22 FT            | 14               | 17   | 14   | 7             | 7.5 | 6      | 6.5     | 59.9   | 39.1 | 41.9 | 44.6 | 7    | 7                | 6      | 6.5    | 64.3    | 157  | 169                                   | 181 | 5 | 6   | 0         |  |  |  |  |  |  |  |
| 24 FT            | 15               | 17   | 14   | 7             | 7   | 6      | 6       | 65.8   | 39.4 | 42.1 | 44.9 | 7    | 6.5              | 6      | 6      | 64.3    | 157  | 169                                   | 181 | 5 | 6   | 0         |  |  |  |  |  |  |  |
| 26 FT            | 16               | 18   | 15   | 7             | 7   | 6      | 6       | 66.1   | 41.5 | 44.4 | 47.3 | 7    | 6.5              | 6      | 6      | 63.3    | 158  | 170                                   | 182 | 6 | 8   | 0         |  |  |  |  |  |  |  |
| 28 FT            | 17               | 19   | 15   | 7             | 7   | 6      | 6       | 66.1   | 42.0 | 44.9 | 47.8 | 7    | 6.5              | 6      | 6      | 64.6    | 159  | 171                                   | 183 | 6 | 8   | 0         |  |  |  |  |  |  |  |
| 30 FT            | 18               | 20   | 16   | 7             | 7   | 6      | 6       | 66.6   | 42.5 | 45.4 | 48.3 | 7    | 6.5              | 6      | 6      | 63.6    | 160  | 172                                   | 184 | 6 | 8   | 0         |  |  |  |  |  |  |  |
| 32 FT            | 19               | 21   | 16   | 7             | 6.5 | 7      | 8       | 72.5   | 44.8 | 47.8 | 50.8 | 7    | 6.5              | 7      | 8      | 68.1    | 161  | 173                                   | 185 | 6 | 8   | 0         |  |  |  |  |  |  |  |
| 34 FT            | 20               | 22   | 16   | 7             | 6.5 | 7      | 7       | 72.5   | 45.3 | 48.3 | 51.3 | 7    | 6.5              | 7      | 7      | 68.1    | 162  | 174                                   | 186 | 6 | 8   | 0         |  |  |  |  |  |  |  |
| 36 FT            | 20               | 22   | 17   | 7             | 6   | 7      | 7.5     | 71.5   | 50.6 | 54.0 | 57.4 | 7    | 6                | 7      | 7      | 67.0    | 162  | 174                                   | 186 | 6 | 7.5 | 0         |  |  |  |  |  |  |  |
| 38 FT            | 21               | 23   | 18   | 7             | 6   | 7      | 7.5     | 72.0   | 45.8 | 48.8 | 51.8 | 7    | 6                | 7      | 7.5    | 67.5    | 163  | 175                                   | 187 | 6 | 7   | 0         |  |  |  |  |  |  |  |
| 40 FT            | 22               | 24   | 18   | 7             | 6   | 7      | 7       | 73.5   | 46.3 | 49.3 | 52.3 | 7    | 6                | 7      | 7.5    | 69.0    | 164  | 176                                   | 188 | 6 | 7   | 0         |  |  |  |  |  |  |  |
| 42 FT            | 23               | 25   | 19   | 7             | 6   | 7      | 7.5     | 74.0   | 48.6 | 51.8 | 54.9 | 7    | 6                | 7      | 8      | 68.0    | 165  | 177                                   | 189 | 6 | 6.5 | 0         |  |  |  |  |  |  |  |
| 44 FT            | 23               | 26   | 20   | 7             | 6   | 7      | 7.5     | 73.0   | 47.0 | 50.0 | 53.0 | 7    | 6                | 6      | 6      | 65.4    | 166  | 178                                   | 190 | 6 | 6.5 | 0         |  |  |  |  |  |  |  |
| 46 FT            | 24               | 26   | 20   | 8             | 7.5 | 7      | 7       | 73.0   | 49.1 | 52.3 | 55.4 | 8    | 7.5              | 7      | 7.5    | 68.4    | 166  | 178                                   | 190 | 6 | 6.5 | 0         |  |  |  |  |  |  |  |
| 48 FT            | 25               | 27   | 21   | 8             | 7.5 | 7      | 7.5     | 73.5   | 49.6 | 52.8 | 55.9 | 8    | 7.5              | 7      | 8      | 68.9    | 167  | 179                                   | 191 | 6 | 6   | 0         |  |  |  |  |  |  |  |
| 50 FT            | 25               | 27   | 21   | 8             | 7   | 7      | 7       | 73.5   | 49.6 | 52.8 | 55.9 | 8    | 7                | 7      | 7      | 68.9    | 167  | 179                                   | 191 | 6 | 6   | 0         |  |  |  |  |  |  |  |

| SPAN (S) = 11 FT |                     |    |    |               |      |         |      |      |       |        |        |      |                  |      |         |      |       | HEIGHT (HT) = 9 FT OR 10 FT OR 11 FT |        |      |      |           |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|---------------|------|---------|------|------|-------|--------|--------|------|------------------|------|---------|------|-------|--------------------------------------|--------|------|------|-----------|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |       |        |        |      | BOTTOM SLAB BARS |      |         |      |       |                                      |        |      |      | WALL BARS |  |  |  |  |  |  |  |
|                  |                     |    |    | A1 BARS       |      | J3 BARS |      |      |       |        |        |      | A2 BARS          |      | J4 BARS |      |       |                                      |        |      |      | B2 BARS   |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |        |        | SIZE | SPA.             | SIZE | SPA.    | C4   | K3    |                                      |        | SIZE | SPA. | G1        |  |  |  |  |  |  |  |
|                  |                     |    |    |               |      |         |      |      | HT=9' | HT=10' | HT=11' |      |                  |      |         |      | HT=9' | HT=10'                               | HT=11' |      |      |           |  |  |  |  |  |  |  |
| 1 FT             | 12                  | 11 | 8  | 6             | 7.5  | 5       | 7    | 82.6 | 32.8  | 35.9   | 39.0   | 6    | 7.5              | 6    | 6.5     | 85.4 | 115   | 127                                  | 139    | 5    | 9.5  | 12        |  |  |  |  |  |  |  |
| 2 FT             | 12                  | 11 | 8  | 6             | 7    | 5       | 6.5  | 82.6 | 32.8  | 35.9   | 39.0   | 6    | 7                | 6    | 6       | 85.4 | 115   | 127                                  | 139    | 5    | 9.5  | 12        |  |  |  |  |  |  |  |
| 2' - 4'          | 12                  | 11 | 9  | 6             | 7    | 6       | 6.5  | 82.6 | 34.1  | 37.5   | 40.9   | 6    | 6.5              | 6    | 6       | 85.4 | 115   | 127                                  | 139    | 5    | 9.5  | 12        |  |  |  |  |  |  |  |
| 4 FT             | 9                   | 10 | 9  | 6             | 7    | 6       | 6.5  | 70.5 | 34.1  | 37.5   | 40.9   | 6    | 6.5              | 6    | 6       | 73.4 | 114   | 126                                  | 138    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |
| 6 FT             | 9                   | 11 | 9  | 6             | 7.5  | 6       | 6    | 57.8 | 30.8  | 33.8   | 36.8   | 6    | 6.5              | 6    | 6       | 64.9 | 115   | 127                                  | 139    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |
| 8 FT             | 9                   | 11 | 9  | 6             | 7    | 7       | 6.5  | 56.4 | 30.8  | 33.8   | 36.8   | 6    | 6                | 6    | 6       | 56.4 | 115   | 127                                  | 139    | 5    | 9    | 0         |  |  |  |  |  |  |  |
| 10 FT            | 10                  | 12 | 9  | 6             | 6.5  | 6       | 6    | 50.8 | 31.3  | 34.3   | 37.3   | 6    | 6                | 6    | 6       | 55.0 | 116   | 128                                  | 140    | 5    | 8.5  | 0         |  |  |  |  |  |  |  |
| 12 FT            | 10                  | 12 | 9  | 6             | 6.5  | 6       | 6    | 46.5 | 31.3  | 34.3   | 37.3   | 6    | 6                | 6    | 6       | 48.0 | 116   | 128                                  | 140    | 5    | 10   | 0         |  |  |  |  |  |  |  |
| 14 FT            | 11                  | 12 | 9  | 6             | 6    | 6       | 6.5  | 45.1 | 35.3  | 38.6   | 42.0   | 7    | 7.5              | 6    | 6       | 46.5 | 116   | 128                                  | 140    | 5    | 9    | 0         |  |  |  |  |  |  |  |
| 16 FT            | 11                  | 13 | 10 | 7             | 7.5  | 6       | 6    | 45.5 | 33.0  | 36.1   | 39.3   | 7    | 7                | 6    | 6.5     | 46.9 | 117   | 129                                  | 141    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |
| 18 FT            | 12                  | 14 | 10 | 7             | 7    | 6       | 6.5  | 45.5 | 32.3  | 35.3   | 38.3   | 7    | 7                | 6    | 6.5     | 45.5 | 118   | 130                                  | 142    | 5    | 8.5  | 0         |  |  |  |  |  |  |  |
| 20 FT            | 13                  | 15 | 10 | 7             | 7    | 6       | 6    | 45.5 | 34.0  | 37.1   | 40.3   | 7    | 6.5              | 6    | 6.5     | 45.5 | 119   | 131                                  | 143    | 5    | 8    | 0         |  |  |  |  |  |  |  |
| 22 FT            | 14                  | 16 | 11 | 7             | 7    | 6       | 6.5  | 45.8 | 35.9  | 39.1   | 42.4   | 7    | 6.5              | 6    | 7.5     | 45.8 | 120   | 132                                  | 144    | 5    | 8    | 0         |  |  |  |  |  |  |  |
| 24 FT            | 15                  | 17 | 11 | 7             | 6.5  | 6       | 6    | 51.5 | 36.5  | 39.8   | 42.9   | 7    | 6.5              | 6    | 7.5     | 45.8 | 121   | 133                                  | 145    | 5    | 7.5  | 0         |  |  |  |  |  |  |  |
| 26 FT            | 16                  | 18 | 12 | 7             | 6.5  | 6       | 6.5  | 51.9 | 37.0  | 40.3   | 43.5   | 7    | 6.5              | 6    | 8       | 46.1 | 122   | 134                                  | 146    | 5    | 7.5  | 0         |  |  |  |  |  |  |  |
| 28 FT            | 17                  | 19 | 12 | 7             | 6.5  | 6       | 6.5  | 51.9 | 37.5  | 40.8   | 44.0   | 7    | 6.5              | 6    | 7.5     | 46.1 | 123   | 135                                  | 147    | 5    | 7    | 0         |  |  |  |  |  |  |  |
| 30 FT            | 18                  | 20 | 13 | 7             | 6.5  | 6       | 6.5  | 52.3 | 38.1  | 41.3   | 44.5   | 7    | 6.5              | 6    | 8       | 46.4 | 124   | 136                                  | 148    | 5    | 7.5  | 0         |  |  |  |  |  |  |  |
| 32 FT            | 19                  | 21 | 13 | 7             | 6    | 6       | 6.5  | 52.3 | 40.0  | 43.4   | 46.8   | 7    | 6                | 6    | 7.5     | 46.4 | 125   | 137                                  | 149    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 34 FT            | 20                  | 22 | 13 | 7             | 6    | 6       | 6    | 52.3 | 40.6  | 44.0   | 47.4   | 7    | 6                | 6    | 7.5     | 46.4 | 126   | 138                                  | 150    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 36 FT            | 21                  | 22 | 13 | 7             | 6    | 6       | 6    | 52.3 | 45.3  | 49.0   | 52.8   | 7    | 6                | 6    | 6.5     | 46.4 | 126   | 138                                  | 150    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 38 FT            | 21                  | 23 | 14 | 8             | 7.5  | 6       | 6    | 52.5 | 41.1  | 44.5   | 47.9   | 7    | 6                | 6    | 7.5     | 46.8 | 127   | 139                                  | 151    | 5    | 6    | 0         |  |  |  |  |  |  |  |
| 40 FT            | 22                  | 24 | 14 | 8             | 7.5  | 6       | 6    | 52.5 | 43.3  | 46.8   | 50.1   | 8    | 7.5              | 6    | 7       | 48.1 | 128   | 140                                  | 152    | 5    | 6    | 0         |  |  |  |  |  |  |  |
| 42 FT            | 23                  | 25 | 15 | 8             | 7.5  | 6       | 6.5  | 52.9 | 48.4  | 52.1   | 56.0   | 8    | 7.5              | 6    | 7.5     | 48.5 | 129   | 141                                  | 153    | 5    | 6    | 0         |  |  |  |  |  |  |  |
| 44 FT            | 24                  | 25 | 15 | 8             | 7    | 6       | 6.5  | 52.9 | 48.6  | 52.5   | 56.4   | 8    | 7                | 6    | 6.5     | 48.5 | 129   | 141                                  | 153    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 46 FT            | 24                  | 26 | 15 | 8             | 7    | 6       | 6    | 52.9 | 49.0  | 52.8   | 56.6   | 8    | 7                | 6    | 7       | 48.5 | 130   | 142                                  | 154    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 48 FT            | 25                  | 27 | 16 | 8             | 7    | 6       | 6    | 53.3 | 49.6  | 53.5   | 57.3   | 8    | 7                | 6    | 7.5     | 48.9 | 131   | 143                                  | 155    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 50 FT            | 26                  | 27 | 16 | 8             | 6.5  | 6       | 6    | 53.3 | 51.5  | 55.5   | 59.4   | 8    | 7                | 6    | 6.5     | 48.9 | 131   | 143                                  | 155    | 6    | 8    | 0         |  |  |  |  |  |  |  |

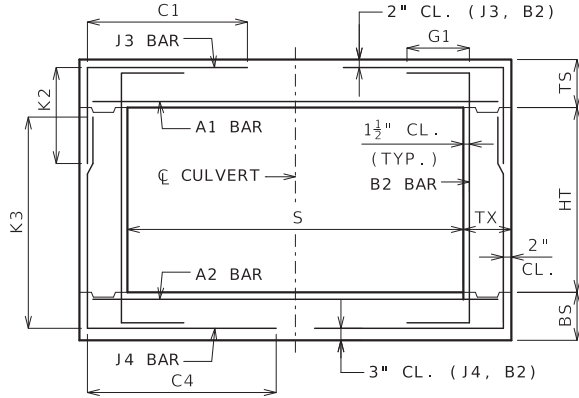


| SPAN (S) = 12 FT |                  |    |    |               |      |      |         |      |       |       |       | HEIGHT (HT) = 6 FT OR 7 FT OR 8 FT |                  |      |      |         |       |       |       |      |      |           |  |  |
|------------------|------------------|----|----|---------------|------|------|---------|------|-------|-------|-------|------------------------------------|------------------|------|------|---------|-------|-------|-------|------|------|-----------|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |      |         |      |       |       |       |                                    | BOTTOM SLAB BARS |      |      |         |       |       |       |      |      | WALL BARS |  |  |
|                  |                  |    |    | A1 BARS       |      |      | J3 BARS |      |       |       |       |                                    | A2 BARS          |      |      | J4 BARS |       |       |       |      |      | B2 BARS   |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE | SPA.    | C1   | K2    |       |       | SIZE                               | SPA.             | SIZE | SPA. | C4      | K3    |       |       | SIZE | SPA. | G1        |  |  |
|                  |                  |    |    |               |      |      |         |      | HT=6' | HT=7' | HT=8' |                                    |                  |      |      |         | HT=6' | HT=7' | HT=8' |      |      |           |  |  |
| 1 FT             | 13               | 10 | 8  | 6             | 7.5  | 5    | 8.5     | 89.6 | 33.3  | 37.8  | 42.1  | 6                                  | 7.5              | 6    | 6.5  | 57.8    | 78    | 90    | 102   | 5    | 12   | 12        |  |  |
| 2 FT             | 14               | 10 | 8  | 6             | 7    | 5    | 8.5     | 89.6 | 34.6  | 39.1  | 43.8  | 6                                  | 7                | 6    | 6    | 51.6    | 78    | 90    | 102   | 5    | 12   | 12        |  |  |
| 2'- 4'           | 14               | 11 | 8  | 6             | 6.5  | 6    | 6.5     | 89.6 | 34.6  | 39.1  | 43.8  | 6                                  | 6.5              | 6    | 6    | 51.6    | 79    | 91    | 103   | 5    | 12   | 12        |  |  |
| 4 FT             | 10               | 11 | 8  | 6             | 6.5  | 6    | 6.5     | 47.1 | 30.8  | 35.0  | 39.3  | 6                                  | 6.5              | 5    | 6.5  | 42.5    | 79    | 91    | 103   | 5    | 12   | 0         |  |  |
| 6 FT             | 10               | 11 | 8  | 6             | 6.5  | 6    | 6.5     | 44.1 | 30.8  | 35.0  | 39.3  | 6                                  | 6                | 5    | 6    | 39.5    | 79    | 91    | 103   | 5    | 12   | 0         |  |  |
| 8 FT             | 10               | 11 | 8  | 6             | 6    | 6    | 6.5     | 41.0 | 30.8  | 35.0  | 39.3  | 7                                  | 7.5              | 6    | 6.5  | 39.5    | 79    | 91    | 103   | 5    | 12   | 0         |  |  |
| 10 FT            | 10               | 11 | 8  | 7             | 7    | 7    | 6       | 42.5 | 34.4  | 39.0  | 43.6  | 7                                  | 6.5              | 6    | 6    | 38.0    | 79    | 91    | 103   | 5    | 12   | 0         |  |  |
| 12 FT            | 11               | 12 | 8  | 7             | 7    | 6    | 6       | 38.0 | 35.1  | 39.8  | 44.5  | 7                                  | 6.5              | 6    | 6.5  | 36.5    | 80    | 92    | 104   | 5    | 12   | 0         |  |  |
| 14 FT            | 11               | 13 | 8  | 7             | 7    | 6    | 6       | 36.5 | 31.9  | 36.0  | 40.3  | 7                                  | 6.5              | 5    | 7    | 30.4    | 81    | 93    | 105   | 5    | 12   | 0         |  |  |
| 16 FT            | 12               | 14 | 8  | 7             | 6.5  | 6    | 6       | 35.0 | 32.5  | 36.8  | 41.0  | 7                                  | 6.5              | 5    | 7    | 30.4    | 82    | 94    | 106   | 5    | 12   | 0         |  |  |
| 18 FT            | 13               | 15 | 8  | 7             | 6    | 6    | 6.5     | 33.5 | 33.3  | 37.5  | 41.6  | 7                                  | 6                | 5    | 6.5  | 30.4    | 83    | 95    | 107   | 5    | 12   | 0         |  |  |
| 20 FT            | 15               | 17 | 8  | 7             | 6    | 6    | 7       | 39.5 | 35.6  | 40.0  | 44.3  | 7                                  | 6.5              | 5    | 7    | 30.4    | 85    | 97    | 109   | 5    | 12   | 0         |  |  |
| 22 FT            | 16               | 18 | 8  | 7             | 6    | 6    | 7       | 39.5 | 36.4  | 40.6  | 45.0  | 7                                  | 6                | 5    | 6.5  | 30.4    | 86    | 98    | 110   | 5    | 12   | 0         |  |  |
| 24 FT            | 17               | 19 | 8  | 8             | 7.5  | 6    | 7       | 39.5 | 37.1  | 41.4  | 45.8  | 7                                  | 6                | 5    | 6.5  | 30.4    | 87    | 99    | 111   | 5    | 11   | 0         |  |  |
| 26 FT            | 18               | 20 | 8  | 8             | 7    | 6    | 7       | 39.5 | 38.9  | 43.3  | 47.8  | 7                                  | 6                | 5    | 6    | 30.4    | 88    | 100   | 112   | 5    | 9.5  | 0         |  |  |
| 28 FT            | 19               | 21 | 8  | 8             | 7    | 6    | 7       | 39.5 | 39.6  | 44.0  | 48.5  | 7                                  | 6                | 6    | 7.5  | 33.5    | 89    | 101   | 113   | 5    | 9.5  | 0         |  |  |
| 30 FT            | 20               | 21 | 8  | 8             | 7    | 6    | 6.5     | 39.5 | 44.3  | 49.3  | 54.1  | 8                                  | 7                | 6    | 7.5  | 33.5    | 89    | 101   | 113   | 5    | 9.5  | 0         |  |  |
| 32 FT            | 21               | 23 | 9  | 8             | 7    | 6    | 7.5     | 39.8 | 41.1  | 45.5  | 50.0  | 8                                  | 7.5              | 5    | 6    | 30.6    | 91    | 103   | 115   | 5    | 8.5  | 0         |  |  |
| 34 FT            | 22               | 23 | 9  | 8             | 6.5  | 6    | 7.5     | 39.8 | 42.5  | 47.1  | 51.6  | 8                                  | 7                | 5    | 6    | 30.6    | 91    | 103   | 115   | 5    | 8.5  | 0         |  |  |
| 36 FT            | 23               | 24 | 9  | 8             | 6.5  | 6    | 7       | 39.8 | 47.9  | 52.9  | 58.0  | 8                                  | 7                | 6    | 7    | 33.6    | 92    | 104   | 116   | 5    | 8.5  | 0         |  |  |
| 38 FT            | 24               | 25 | 9  | 8             | 6.5  | 6    | 6.5     | 39.8 | 48.8  | 53.8  | 58.8  | 8                                  | 7                | 6    | 7    | 33.6    | 93    | 105   | 117   | 5    | 8.5  | 0         |  |  |
| 40 FT            | 24               | 26 | 10 | 8             | 6    | 6    | 7       | 40.0 | 44.5  | 49.0  | 53.6  | 8                                  | 7                | 5    | 6    | 30.8    | 94    | 106   | 118   | 5    | 8    | 0         |  |  |
| 42 FT            | 25               | 27 | 10 | 8             | 6    | 6    | 7       | 40.0 | 45.3  | 49.8  | 54.4  | 8                                  | 7                | 6    | 7    | 33.9    | 95    | 107   | 119   | 5    | 8    | 0         |  |  |
| 44 FT            | 26               | 27 | 10 | 8             | 6    | 6    | 7       | 40.0 | 50.4  | 55.5  | 60.5  | 8                                  | 6.5              | 6    | 7    | 33.9    | 95    | 107   | 119   | 5    | 8    | 0         |  |  |
| 46 FT            | 27               | 28 | 10 | 8             | 6    | 6    | 7       | 40.0 | 51.3  | 56.3  | 61.4  | 8                                  | 6.5              | 6    | 7    | 33.9    | 96    | 108   | 120   | 5    | 7.5  | 0         |  |  |
| 48 FT            | 28               | 29 | 11 | 8             | 6    | 6    | 7.5     | 40.3 | 52.1  | 57.1  | 62.1  | 8                                  | 6.5              | 6    | 7.5  | 34.1    | 97    | 109   | 121   | 5    | 7.5  | 0         |  |  |
| 50 FT            | 28               | 30 | 11 | 8             | 6    | 6    | 7.5     | 40.3 | 52.5  | 57.5  | 62.6  | 8                                  | 6.5              | 6    | 7    | 34.1    | 98    | 110   | 122   | 5    | 7.5  | 0         |  |  |

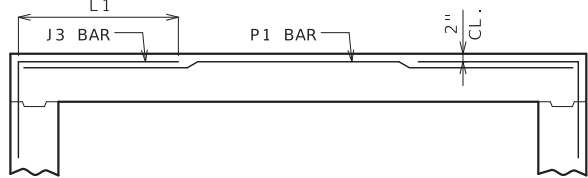
| SPAN (S) = 12 FT |                  |      |      |               |     |         |        |      |      | HEIGHT (HT) = 12 FT OR 13 FT |      |                  |        |         |      |      |     |   |     |           |  |  |  |
|------------------|------------------|------|------|---------------|-----|---------|--------|------|------|------------------------------|------|------------------|--------|---------|------|------|-----|---|-----|-----------|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      | TOP SLAB BARS |     |         |        |      |      |                              |      | BOTTOM SLAB BARS |        |         |      |      |     |   |     | WALL BARS |  |  |  |
|                  |                  |      |      | A1 BARS       |     | J3 BARS |        |      |      |                              |      | A2 BARS          |        | J4 BARS |      |      |     |   |     | B2 BARS   |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA.          | C1  | K2      |        | SIZE | SPA. | SIZE                         | SPA. | C4               | K3     |         | SIZE | SPA. | G1  |   |     |           |  |  |  |
|                  |                  |      |      |               |     | HT=12'  | HT=13' |      |      |                              |      |                  | HT=12' | HT=13'  |      |      |     |   |     |           |  |  |  |
| 1 FT             | 12               | 11   | 9    | 6             | 6.5 | 5       | 6      | 90.3 | 32.4 | 34.8                         | 6    | 6.5              | 6      | 6       | 91.8 | 151  | 163 | 5 | 8.5 | 12        |  |  |  |
| 2 FT             | 12               | 11   | 9    | 6             | 6.5 | 6       | 7      | 91.8 | 34.0 | 36.5                         | 6    | 6.5              | 6      | 6       | 91.8 | 151  | 163 | 5 | 8.5 | 12        |  |  |  |
| 2'- 4'           | 12               | 12   | 9    | 6             | 6.5 | 6       | 6      | 91.8 | 35.4 | 38.0                         | 6    | 6.5              | 6      | 6       | 91.8 | 152  | 164 | 5 | 8.5 | 12        |  |  |  |
| 4 FT             | 10               | 12   | 9    | 6             | 6.5 | 6       | 6      | 91.8 | 35.4 | 38.0                         | 6    | 6.5              | 6      | 6       | 91.8 | 152  | 164 | 5 | 8.5 | 0         |  |  |  |
| 6 FT             | 10               | 12   | 9    | 6             | 6.5 | 7       | 6.5    | 81.1 | 35.4 | 38.0                         | 6    | 6                | 6      | 6       | 91.8 | 152  | 164 | 5 | 8   | 0         |  |  |  |
| 8 FT             | 10               | 12   | 10   | 6             | 6.5 | 6       | 6      | 64.6 | 35.4 | 38.0                         | 7    | 7.5              | 6      | 6       | 73.9 | 152  | 164 | 5 | 8   | 0         |  |  |  |
| 10 FT            | 11               | 13   | 10   | 6             | 6   | 6       | 6      | 61.6 | 35.9 | 38.5                         | 7    | 7.5              | 6      | 6       | 69.3 | 153  | 165 | 5 | 8   | 0         |  |  |  |
| 12 FT            | 12               | 13   | 11   | 6             | 6   | 6       | 7      | 58.9 | 36.1 | 38.8                         | 7    | 7                | 6      | 6       | 62.0 | 153  | 165 | 5 | 7.5 | 0         |  |  |  |
| 14 FT            | 12               | 13   | 11   | 6             | 6   | 6       | 7      | 54.3 | 36.1 | 38.8                         | 7    | 7                | 6      | 6       | 55.8 | 153  | 165 | 5 | 7.5 | 0         |  |  |  |
| 16 FT            | 12               | 14   | 11   | 7             | 7   | 6       | 6      | 52.8 | 36.3 | 39.0                         | 7    | 6.5              | 6      | 6.5     | 55.8 | 154  | 166 | 5 | 7.5 | 0         |  |  |  |
| 18 FT            | 13               | 16   | 12   | 7             | 7   | 6       | 6      | 53.0 | 38.6 | 41.4                         | 7    | 6.5              | 6      | 7       | 56.1 | 156  | 168 | 5 | 7   | 0         |  |  |  |
| 20 FT            | 14               | 16   | 12   | 7             | 6.5 | 6       | 6      | 53.0 | 38.9 | 41.6                         | 7    | 6                | 6      | 6       | 54.6 | 156  | 168 | 5 | 7   | 0         |  |  |  |
| 22 FT            | 16               | 18   | 13   | 7             | 6.5 | 6       | 6      | 59.6 | 41.5 | 44.4                         | 7    | 6.5              | 6      | 7       | 55.0 | 158  | 170 | 5 | 6.5 | 0         |  |  |  |
| 24 FT            | 16               | 19   | 13   | 7             | 6   | 7       | 7      | 64.4 | 40.0 | 42.8                         | 7    | 6                | 6      | 6.5     | 55.0 | 159  | 171 | 5 | 6.5 | 0         |  |  |  |
| 26 FT            | 18               | 20   | 14   | 7             | 6.5 | 6       | 6      | 58.5 | 42.5 | 45.4                         | 7    | 6                | 6      | 6.5     | 55.3 | 160  | 172 | 5 | 6   | 0         |  |  |  |
| 28 FT            | 18               | 21   | 14   | 7             | 6   | 7       | 7      | 63.3 | 42.8 | 45.6                         | 7    | 6                | 6      | 6.5     | 55.3 | 161  | 173 | 5 | 6   | 0         |  |  |  |
| 30 FT            | 19               | 22   | 14   | 8             | 7.5 | 7       | 6.5    | 63.3 | 43.3 | 46.1                         | 7    | 6                | 6      | 6       | 55.3 | 162  | 174 | 5 | 6   | 0         |  |  |  |
| 32 FT            | 20               | 23   | 15   | 8             | 7.5 | 7       | 7.5    | 63.6 | 45.5 | 48.5                         | 8    | 7.5              | 6      | 6.5     | 55.6 | 163  | 175 | 6 | 8   | 0         |  |  |  |
| 34 FT            | 21               | 23   | 15   | 8             | 7   | 7       | 7      | 63.6 | 45.8 | 48.8                         | 8    | 7                | 6      | 6       | 55.6 | 163  | 175 | 6 | 8   | 0         |  |  |  |
| 36 FT            | 22               | 24   | 16   | 8             | 7   | 7       | 7.5    | 64.0 | 46.3 | 49.3                         | 8    | 7                | 6      | 6.5     | 56.0 | 164  | 176 | 6 | 8   | 0         |  |  |  |
| 38 FT            | 23               | 25   | 16   | 8             | 7   | 7       | 7      | 64.0 | 48.6 | 51.8                         | 8    | 7                | 6      | 6       | 56.0 | 165  | 177 | 6 | 8   | 0         |  |  |  |
| 40 FT            | 24               | 26   | 17   | 8             | 7   | 7       | 7.5    | 64.4 | 49.1 | 52.3                         | 8    | 7                | 6      | 6.5     | 56.4 | 166  | 178 | 6 | 7.5 | 0         |  |  |  |
| 42 FT            | 24               | 27   | 17   | 8             | 6.5 | 7       | 6.5    | 64.4 | 49.4 | 52.5                         | 8    | 7                | 6      | 6       | 56.4 | 167  | 179 | 6 | 7.5 | 0         |  |  |  |
| 44 FT            | 25               | 28   | 18   | 8             | 6.5 | 7       | 7      | 66.4 | 49.9 | 53.0                         | 8    | 7                | 6      | 6.5     | 56.8 | 168  | 180 | 6 | 7   | 0         |  |  |  |
| 46 FT            | 26               | 28   | 18   | 8             | 6.5 | 7       | 7      | 66.4 | 50.1 | 53.3                         | 8    | 6.5              | 6      | 6       | 56.8 | 168  | 180 | 6 | 7   | 0         |  |  |  |
| 48 FT            | 27               | 29   | 19   | 8             | 6.5 | 7       | 7.5    | 66.9 | 52.6 | 55.9                         | 8    | 6.5              | 6      | 6.5     | 57.0 | 169  | 181 | 6 | 6.5 | 0         |  |  |  |
| 50 FT            | 28               | 30   | 19   | 8             | 6.5 | 7       | 7      | 66.9 | 53.3 | 56.4                         | 8    | 6.5              | 6      | 6       | 57.0 | 170  | 182 | 6 | 6.5 | 0         |  |  |  |

| SPAN (S) = 13 FT |                  |    |    |               |      |      |         |      |       |       |       | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |                  |      |      |         |       |       |       |      |      |           |  |  |
|------------------|------------------|----|----|---------------|------|------|---------|------|-------|-------|-------|------------------------------------|------------------|------|------|---------|-------|-------|-------|------|------|-----------|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |      |         |      |       |       |       |                                    | BOTTOM SLAB BARS |      |      |         |       |       |       |      |      | WALL BARS |  |  |
|                  |                  |    |    | A1 BARS       |      |      | J3 BARS |      |       |       |       |                                    | A2 BARS          |      |      | J4 BARS |       |       |       |      |      | B2 BARS   |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE | SPA.    | C1   | K2    |       |       | SIZE                               | SPA.             | SIZE | SPA. | C4      | K3    |       |       | SIZE | SPA. | G1        |  |  |
|                  |                  |    |    |               |      |      |         |      | HT=7' | HT=8' | HT=9' |                                    |                  |      |      |         | HT=7' | HT=8' | HT=9' |      |      |           |  |  |
| 1 FT             | 13               | 11 | 8  | 6             | 6.5  | 5    | 8.5     | 95.1 | 34.0  | 38.0  | 41.9  | 6                                  | 7                | 6    | 7    | 67.3    | 91    | 103   | 115   | 5    | 12   | 11        |  |  |
| 2 FT             | 13               | 11 | 8  | 6             | 6    | 5    | 6.5     | 95.1 | 34.0  | 38.0  | 41.9  | 6                                  | 6.5              | 6    | 6.5  | 59.0    | 91    | 103   | 115   | 5    | 12   | 12        |  |  |
| 2'- 4'           | 13               | 11 | 8  | 6             | 6    | 6    | 6       | 95.1 | 34.0  | 38.0  | 41.9  | 6                                  | 6                | 6    | 6.5  | 59.0    | 91    | 103   | 115   | 5    | 12   | 12        |  |  |
| 4 FT             | 10               | 11 | 8  | 7             | 7.5  | 6    | 6       | 49.3 | 31.0  | 34.8  | 38.5  | 6                                  | 6                | 6    | 6.5  | 49.3    | 91    | 103   | 115   | 5    | 12   | 0         |  |  |
| 6 FT             | 10               | 11 | 8  | 7             | 7.5  | 6    | 6       | 45.9 | 34.0  | 38.1  | 42.1  | 7                                  | 7                | 6    | 6    | 45.9    | 91    | 103   | 115   | 5    | 12   | 0         |  |  |
| 8 FT             | 10               | 12 | 8  | 7             | 7    | 7    | 6       | 47.5 | 30.3  | 33.9  | 37.5  | 7                                  | 7                | 6    | 7    | 42.6    | 92    | 104   | 116   | 5    | 12   | 0         |  |  |
| 10 FT            | 11               | 12 | 8  | 7             | 6.5  | 7    | 6.5     | 44.3 | 35.8  | 39.9  | 44.1  | 7                                  | 6                | 6    | 6    | 41.0    | 92    | 104   | 116   | 5    | 12   | 0         |  |  |
| 12 FT            | 12               | 13 | 8  | 7             | 6    | 7    | 6.5     | 42.6 | 36.4  | 40.6  | 44.8  | 7                                  | 6                | 6    | 6.5  | 39.4    | 93    | 105   | 117   | 5    | 12   | 0         |  |  |
| 14 FT            | 12               | 14 | 8  | 7             | 6    | 7    | 6.5     | 41.0 | 32.5  | 36.3  | 40.0  | 7                                  | 6                | 5    | 6    | 32.8    | 94    | 106   | 118   | 5    | 12   | 0         |  |  |
| 16 FT            | 13               | 15 | 8  | 8             | 7.5  | 7    | 6.5     | 39.4 | 33.1  | 36.9  | 40.6  | 7                                  | 6                | 5    | 6    | 31.1    | 95    | 107   | 119   | 5    | 12   | 0         |  |  |
| 18 FT            | 14               | 16 | 8  | 8             | 7    | 7    | 7       | 37.8 | 34.9  | 38.8  | 42.5  | 8                                  | 7.5              | 6    | 8    | 34.5    | 96    | 108   | 120   | 5    | 12   | 0         |  |  |
| 20 FT            | 15               | 18 | 8  | 8             | 6.5  | 7    | 7       | 45.9 | 35.9  | 39.6  | 43.5  | 8                                  | 7.5              | 5    | 6    | 31.1    | 98    | 110   | 122   | 5    | 11.5 | 0         |  |  |
| 22 FT            | 17               | 19 | 8  | 8             | 7    | 6    | 6       | 41.0 | 38.0  | 41.9  | 45.9  | 8                                  | 7.5              | 6    | 8    | 34.5    | 99    | 111   | 123   | 5    | 9.5  | 0         |  |  |
| 24 FT            | 18               | 20 | 8  | 8             | 6.5  | 7    | 7.5     | 45.9 | 38.6  | 42.6  | 46.5  | 8                                  | 7                | 6    | 7.5  | 34.5    | 100   | 112   | 124   | 5    | 9.5  | 0         |  |  |
| 26 FT            | 19               | 21 | 9  | 8             | 6.5  | 6    | 6       | 41.3 | 39.3  | 43.3  | 47.3  | 8                                  | 7                | 5    | 6    | 31.4    | 101   | 113   | 125   | 5    | 9    | 0         |  |  |
| 28 FT            | 20               | 22 | 10 | 8             | 6.5  | 6    | 6.5     | 41.5 | 41.1  | 45.3  | 49.3  | 8                                  | 7                | 5    | 6    | 33.3    | 102   | 114   | 126   | 5    | 10   | 0         |  |  |
| 30 FT            | 21               | 23 | 10 | 8             | 6.5  | 6    | 6.5     | 41.5 | 41.9  | 45.9  | 50.0  | 8                                  | 6.5              | 5    | 6    | 33.3    | 103   | 115   | 127   | 5    | 9    | 0         |  |  |
| 32 FT            | 22               | 24 | 10 | 8             | 6    | 6    | 6       | 41.5 | 42.5  | 46.6  | 50.6  | 8                                  | 6.5              | 5    | 6    | 33.3    | 104   | 116   | 128   | 5    | 8    | 0         |  |  |
| 34 FT            | 23               | 25 | 11 | 8             | 6    | 6    | 6.5     | 41.8 | 43.1  | 47.3  | 51.4  | 8                                  | 6.5              | 5    | 6.5  | 33.4    | 105   | 117   | 129   | 5    | 8.5  | 0         |  |  |
| 36 FT            | 24               | 26 | 11 | 8             | 6    | 6    | 6.5     | 41.8 | 45.1  | 49.4  | 53.5  | 8                                  | 6.5              | 5    | 6    | 33.4    | 106   | 118   | 130   | 5    | 8    | 0         |  |  |
| 38 FT            | 25               | 27 | 12 | 8             | 6    | 6    | 6.5     | 42.0 | 45.9  | 50.0  | 54.3  | 8                                  | 6.5              | 5    | 6    | 33.6    | 107   | 119   | 131   | 5    | 8.5  | 0         |  |  |
| 40 FT            | 26               | 28 | 12 | 8             | 6    | 6    | 7       | 42.0 | 46.5  | 50.8  | 55.0  | 8                                  | 6.5              | 5    | 6    | 33.6    | 108   | 120   | 132   | 5    | 7.5  | 0         |  |  |
| 42 FT            | 27               | 29 | 12 | 9             | 7.5  | 6    | 7       | 42.0 | 51.3  | 55.9  | 60.4  | 8                                  | 6                | 6    | 8.5  | 37.0    | 109   | 121   | 133   | 5    | 7    | 0         |  |  |
| 44 FT            | 28               | 30 | 12 | 9             | 7    | 6    | 7       | 42.0 | 52.0  | 56.6  | 61.1  | 8                                  | 6                | 6    | 8    | 37.0    | 110   | 122   | 134   | 5    | 7    | 0         |  |  |
| 46 FT            | 29               | 30 | 12 | 9             | 7    | 6    | 7       | 42.0 | 53.9  | 58.5  | 63.1  | 8                                  | 6                | 6    | 7.5  | 37.0    | 110   | 122   | 134   | 5    | 7    | 0         |  |  |
| 48 FT            | 30               | 31 | 12 | 9             | 7    | 6    | 7       | 42.0 | 54.6  | 59.3  | 64.0  | 8                                  | 6                | 6    | 7.5  | 37.0    | 111   | 123   | 135   | 5    | 7    | 0         |  |  |
| 50 FT            | 30               | 32 | 12 | 9             | 7    | 6    | 6.5     | 42.0 | 55.0  | 59.6  | 64.4  | 8                                  | 6                | 6    | 7.5  | 37.0    | 112   | 124   | 136   | 5    | 7    | 0         |  |  |

| SPAN (S) = 13 FT |                     |    |    |               |      |         |      |      |        |         |      | HEIGHT (HT) = 13 FT OR 14 FT |      |      |      |         |        |      |      |           |   |  |  |
|------------------|---------------------|----|----|---------------|------|---------|------|------|--------|---------|------|------------------------------|------|------|------|---------|--------|------|------|-----------|---|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |      |        |         |      | BOTTOM SLAB BARS             |      |      |      |         |        |      |      | WALL BARS |   |  |  |
|                  |                     |    |    | A1 BARS       |      | J3 BARS |      |      |        | A2 BARS |      | J4 BARS                      |      |      |      | B2 BARS |        |      |      |           |   |  |  |
|                  | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |         | SIZE | SPA.                         | SIZE | SPA. | C4   | K3      |        | SIZE | SPA. | G1        |   |  |  |
|                  |                     |    |    |               |      |         |      |      | HT=13' | HT=14'  |      |                              |      |      |      | HT=13'  | HT=14' |      |      |           |   |  |  |
| 1 FT             | 12                  | 12 | 9  | 6             | 6    | 6       | 6.5  | 99.0 | 36.8   | 39.3    | 6    | 6.5                          | 6    | 6    | 99.0 | 164     | 176    | 5    | 8.5  | 1         |   |  |  |
| 2 FT             | 12                  | 12 | 9  | 7             | 8    | 6       | 6.5  | 99.0 | 36.8   | 39.3    | 6    | 6                            | 6    | 6    | 99.0 | 164     | 176    | 5    | 8    | 12        |   |  |  |
| 2'- 4'           | 12                  | 12 | 10 | 7             | 8    | 6       | 6    | 99.6 | 36.8   | 39.3    | 7    | 8                            | 6    | 6    | 99.6 | 164     | 176    | 5    | 8    | 12        |   |  |  |
| 4 FT             | 10                  | 12 | 10 | 6             | 6    | 6       | 6    | 99.6 | 34.6   | 37.0    | 7    | 8                            | 6    | 6    | 99.6 | 164     | 176    | 5    | 8    | 0         |   |  |  |
| 6 FT             | 11                  | 13 | 10 | 6             | 6    | 6       | 6.5  | 84.6 | 35.0   | 37.4    | 6    | 6                            | 6    | 6.5  | 99.6 | 165     | 177    | 5    | 7.5  | 0         |   |  |  |
| 8 FT             | 11                  | 13 | 10 | 6             | 6    | 7       | 6.5  | 74.8 | 35.0   | 37.4    | 7    | 7                            | 6    | 6    | 84.6 | 165     | 177    | 5    | 7    | 0         |   |  |  |
| 10 FT            | 11                  | 13 | 11 | 7             | 7.5  | 7       | 6.5  | 68.5 | 35.0   | 37.4    | 7    | 6.5                          | 6    | 6    | 70.1 | 165     | 177    | 5    | 7.5  | 0         |   |  |  |
| 12 FT            | 12                  | 14 | 12 | 7             | 7    | 6       | 6.5  | 62.1 | 37.1   | 39.8    | 7    | 6.5                          | 6    | 6.5  | 67.3 | 166     | 178    | 5    | 7    | 0         |   |  |  |
| 14 FT            | 13                  | 15 | 12 | 7             | 7    | 6       | 6    | 62.1 | 37.6   | 40.1    | 7    | 6                            | 6    | 6    | 65.5 | 167     | 179    | 5    | 7    | 0         |   |  |  |
| 16 FT            | 13                  | 15 | 12 | 7             | 6.5  | 7       | 7    | 60.5 | 37.6   | 40.1    | 7    | 6                            | 6    | 6.5  | 58.8 | 167     | 179    | 5    | 7    | 0         |   |  |  |
| 18 FT            | 14                  | 17 | 13 | 7             | 6.5  | 7       | 8    | 59.1 | 38.3   | 40.8    | 7    | 6                            | 6    | 6.5  | 59.1 | 169     | 181    | 5    | 6.5  | 0         |   |  |  |
| 20 FT            | 15                  | 18 | 13 | 7             | 6    | 7       | 7    | 67.6 | 40.5   | 43.1    | 7    | 6                            | 6    | 6    | 59.1 | 170     | 182    | 5    | 6.5  | 0         |   |  |  |
| 22 FT            | 17                  | 19 | 14 | 7             | 6    | 7       | 7.5  | 68.0 | 41.1   | 43.8    | 7    | 6                            | 6    | 6    | 59.5 | 171     | 183    | 5    | 6    | 0         |   |  |  |
| 24 FT            | 18                  | 20 | 14 | 7             | 6    | 7       | 7.5  | 66.3 | 43.5   | 46.3    | 8    | 7.5                          | 6    | 6    | 59.5 | 172     | 184    | 5    | 6    | 0         |   |  |  |
| 26 FT            | 19                  | 21 | 15 | 8             | 7.5  | 7       | 7.5  | 66.8 | 43.9   | 46.8    | 8    | 7                            | 6    | 6    | 58.1 | 173     | 185    | 6    | 8    | 0         |   |  |  |
| 28 FT            | 20                  | 22 | 15 | 8             | 7    | 7       | 7    | 66.8 | 44.4   | 47.1    | 8    | 7                            | 6    | 6    | 58.1 | 174     | 186    | 6    | 8    | 0         |   |  |  |
| 30 FT            | 21                  | 23 | 16 | 8             | 7    | 7       | 7    | 67.1 | 46.8   | 49.6    | 8    | 7                            | 6    | 6    | 58.5 | 175     | 187    | 6    | 8    | 0         |   |  |  |
| 32 FT            | 22                  | 24 | 16 | 8             | 7    | 7       | 7    | 67.1 | 49.3   | 52.3    | 8    | 7                            | 7    | 7.5  | 61.9 | 176     | 188    | 6    | 8    | 0         |   |  |  |
| 34 FT            | 23                  | 25 | 17 | 8             | 6.5  | 7       | 7    | 67.5 | 47.8   | 50.6    | 8    | 6.5                          | 6    | 6    | 58.9 | 177     | 189    | 6    | 7.5  | 0         |   |  |  |
| 36 FT            | 24                  | 26 | 17 | 8             | 6.5  | 7       | 6.5  | 67.5 | 52.3   | 55.4    | 8    | 6.5                          | 7    | 7.5  | 62.3 | 178     | 190    | 6    | 7.5  | 0         |   |  |  |
| 38 FT            | 25                  | 27 | 18 | 8             | 6.5  | 7       | 7    | 67.9 | 50.8   | 53.8    | 8    | 6.5                          | 6    | 6    | 59.1 | 179     | 191    | 6    | 7    | 0         |   |  |  |
| 40 FT            | 25                  | 28 | 18 | 8             | 6    | 7       | 6    | 67.9 | 51.0   | 54.0    | 8    | 6.5                          | 6    | 6    | 59.1 | 180     | 192    | 6    | 7    | 0         |   |  |  |
| 42 FT            | 26                  | 29 | 19 | 8             | 6    | 7       | 6.5  | 68.3 | 51.5   | 54.5    | 8    | 6.5                          | 6    | 6    | 59.5 | 181     | 193    | 6    | 6.5  | 0         |   |  |  |
| 44 FT            | 27                  | 30 | 19 | 8             | 6    | 7       | 6    | 68.3 | 52.0   | 55.0    | 8    | 6                            | 6    | 6    | 59.5 | 182     | 194    | 6    | 6.5  | 0         |   |  |  |
| 46 FT            | 28                  | 31 | 20 | 8             | 6    | 7       | 6.5  | 68.6 | 52.5   | 55.5    | 8    | 6                            | 6    | 6    | 59.9 | 183     | 195    | 6    | 6.5  | 0         |   |  |  |
| 48 FT            | 29                  | 31 | 20 | 8             | 6    | 7       | 6    | 68.6 | 57.0   | 60.3    | 8    | 6                            | 6    | 7    | 7.5  | 63.4    | 183    | 195  | 6    | 6.5       | 0 |  |  |
| 50 FT            | 30                  | 32 | 21 | 9             | 7.5  | 7       | 7    | 69.0 | 55.4   | 58.5    | 8    | 6                            | 6    | 6    | 60.1 | 184     | 196    | 6    | 6    | 0         |   |  |  |



BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT  $\varnothing$  CULVERT.



ALTERNATE J3 BAR

AT CONTRACTOR'S OPTION, ALTERNATE J3 BARS MAY BE USED WHEN THE DISTANCE BETWEEN THE ENDS OF J3 BARS IN THE TOP SLAB IS LESS THAN 2'-0". DIMENSION L1 (NOT C1) SHALL BE USED WITH ALTERNATE J3 BARS, WHERE L1 IS EQUAL TO 18", 22" AND 28" FOR #4, #5 AND #6 BARS, RESPECTIVELY. ADDITIONAL P1 BARS ARE REQUIRED WITH ALTERNATE J3 BARS WITH A LENGTH EQUAL TO A1 BARS, AND SIZE AND SPACING EQUAL TO J3 BARS. NO ADDITIONAL PAYMENT WILL BE MADE FOR THIS SUBSTITUTION.

| SPAN (S) = 13 FT |  |  |  |  |  |  |  |  |  |  |  | HEIGHT (HT) = 10 FT OR 11 FT OR 12 FT |  |  |
|------------------|--|--|--|--|--|--|--|--|--|--|--|---------------------------------------|--|--|
|------------------|--|--|--|--|--|--|--|--|--|--|--|---------------------------------------|--|--|



| SPAN (S) = 14 FT |                  |    |    |               |      |         |      |       |       |       |       | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |                  |      |         |      |       |       |       |      |      |           |  |  |
|------------------|------------------|----|----|---------------|------|---------|------|-------|-------|-------|-------|------------------------------------|------------------|------|---------|------|-------|-------|-------|------|------|-----------|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |         |      |       |       |       |       |                                    | BOTTOM SLAB BARS |      |         |      |       |       |       |      |      | WALL BARS |  |  |
|                  |                  |    |    | A1 BARS       |      | J3 BARS |      |       |       |       |       |                                    | A2 BARS          |      | J4 BARS |      |       |       |       |      |      | B2 BARS   |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1    | K2    |       |       | SIZE                               | SPA.             | SIZE | SPA.    | C4   | K3    |       |       | SIZE | SPA. | G1        |  |  |
|                  |                  |    |    |               |      |         |      |       | HT=7' | HT=8' | HT=9' |                                    |                  |      |         |      | HT=7' | HT=8' | HT=9' |      |      |           |  |  |
| 1 FT             | 13               | 12 | 8  | 6             | 6    | 5       | 7    | 102.1 | 33.3  | 37.1  | 41.0  | 6                                  | 6.5              | 6    | 6.5     | 66.9 | 92    | 104   | 116   | 5    | 12   | 12        |  |  |
| 2 FT             | 13               | 12 | 8  | 7             | 8    | 5       | 6    | 102.1 | 33.3  | 37.1  | 41.0  | 6                                  | 6                | 6    | 6       | 58.1 | 92    | 104   | 116   | 5    | 12   | 12        |  |  |
| 2'- 4'           | 13               | 12 | 8  | 7             | 6.5  | 7       | 6    | 102.1 | 34.0  | 38.1  | 42.1  | 7                                  | 7                | 6    | 6       | 58.1 | 92    | 104   | 116   | 5    | 12   | 12        |  |  |
| 4 FT             | 10               | 11 | 8  | 7             | 6.5  | 7       | 6    | 52.8  | 34.0  | 38.1  | 42.1  | 7                                  | 7                | 6    | 6       | 49.3 | 91    | 103   | 115   | 5    | 12   | 0         |  |  |
| 6 FT             | 11               | 12 | 8  | 7             | 7    | 6       | 6    | 45.8  | 31.6  | 35.4  | 39.0  | 7                                  | 7                | 6    | 7       | 44.0 | 92    | 104   | 116   | 5    | 12   | 0         |  |  |
| 8 FT             | 11               | 12 | 8  | 7             | 6.5  | 7       | 6.5  | 45.8  | 35.8  | 39.9  | 44.1  | 7                                  | 6                | 6    | 6       | 42.3 | 92    | 104   | 116   | 5    | 12   | 0         |  |  |
| 10 FT            | 12               | 13 | 8  | 7             | 6    | 7       | 6.5  | 44.0  | 33.3  | 37.1  | 41.0  | 8                                  | 7.5              | 6    | 6.5     | 38.8 | 93    | 105   | 117   | 5    | 12   | 0         |  |  |
| 12 FT            | 12               | 14 | 8  | 8             | 7    | 7       | 6    | 42.3  | 36.8  | 41.0  | 45.1  | 8                                  | 7                | 6    | 7       | 37.0 | 94    | 106   | 118   | 5    | 12   | 0         |  |  |
| 14 FT            | 13               | 16 | 8  | 8             | 6.5  | 7       | 6    | 42.3  | 33.5  | 37.3  | 40.9  | 8                                  | 7                | 5    | 6       | 31.6 | 96    | 108   | 120   | 5    | 12   | 0         |  |  |
| 16 FT            | 13               | 16 | 8  | 8             | 6.5  | 7       | 6    | 40.5  | 33.5  | 37.3  | 40.9  | 8                                  | 7                | 5    | 6       | 31.6 | 96    | 108   | 120   | 5    | 12   | 0         |  |  |
| 18 FT            | 15               | 17 | 8  | 8             | 6.5  | 7       | 7    | 45.8  | 35.5  | 39.4  | 43.3  | 8                                  | 6.5              | 6    | 7.5     | 35.3 | 97    | 109   | 121   | 5    | 12   | 0         |  |  |
| 20 FT            | 16               | 19 | 8  | 8             | 6    | 7       | 6.5  | 45.8  | 36.5  | 40.4  | 44.1  | 8                                  | 7                | 5    | 6       | 31.6 | 99    | 111   | 123   | 5    | 11.5 | 0         |  |  |
| 22 FT            | 18               | 20 | 8  | 8             | 6    | 7       | 7.5  | 45.8  | 38.6  | 42.6  | 46.5  | 8                                  | 6.5              | 6    | 7.5     | 35.3 | 100   | 112   | 124   | 5    | 9.5  | 0         |  |  |
| 24 FT            | 19               | 21 | 8  | 8             | 6    | 7       | 7    | 45.8  | 44.0  | 48.5  | 52.9  | 8                                  | 6.5              | 6    | 7.5     | 35.3 | 101   | 113   | 125   | 5    | 9.5  | 0         |  |  |
| 26 FT            | 21               | 23 | 9  | 8             | 6    | 6       | 6.5  | 42.5  | 41.9  | 45.9  | 50.0  | 8                                  | 6.5              | 5    | 6       | 33.6 | 103   | 115   | 127   | 5    | 8.5  | 0         |  |  |
| 28 FT            | 22               | 24 | 9  | 8             | 6    | 6       | 6    | 42.5  | 46.3  | 50.8  | 55.1  | 8                                  | 6.5              | 6    | 7       | 35.4 | 104   | 116   | 128   | 5    | 8.5  | 0         |  |  |
| 30 FT            | 23               | 25 | 10 | 8             | 6    | 6       | 6.5  | 42.8  | 43.1  | 47.3  | 51.4  | 8                                  | 6.5              | 5    | 6       | 33.9 | 105   | 117   | 129   | 5    | 8.5  | 0         |  |  |
| 32 FT            | 24               | 26 | 10 | 9             | 7.5  | 6       | 6    | 42.8  | 45.1  | 49.4  | 53.5  | 8                                  | 6                | 5    | 6       | 33.9 | 106   | 118   | 130   | 5    | 8    | 0         |  |  |
| 34 FT            | 25               | 27 | 11 | 9             | 7    | 6       | 7    | 43.0  | 45.9  | 50.0  | 54.3  | 8                                  | 6                | 5    | 6       | 34.0 | 107   | 119   | 131   | 5    | 8.5  | 0         |  |  |
| 36 FT            | 26               | 28 | 11 | 9             | 7    | 6       | 7    | 43.0  | 46.5  | 50.8  | 55.0  | 8                                  | 6                | 5    | 6       | 34.0 | 108   | 120   | 132   | 5    | 7.5  | 0         |  |  |
| 38 FT            | 27               | 29 | 11 | 9             | 7    | 6       | 7    | 43.0  | 51.3  | 55.9  | 60.4  | 8                                  | 6                | 6    | 7.5     | 37.6 | 109   | 121   | 133   | 5    | 7.5  | 0         |  |  |
| 40 FT            | 28               | 30 | 11 | 9             | 7    | 6       | 6.5  | 43.0  | 52.0  | 56.6  | 61.1  | 8                                  | 6                | 6    | 7       | 37.6 | 110   | 122   | 134   | 5    | 7.5  | 0         |  |  |
| 42 FT            | 29               | 31 | 12 | 9             | 6.5  | 6       | 7    | 43.3  | 54.3  | 58.9  | 63.6  | 9                                  | 7.5              | 6    | 7.5     | 37.8 | 111   | 123   | 135   | 5    | 7    | 0         |  |  |
| 44 FT            | 30               | 32 | 12 | 9             | 6.5  | 6       | 7    | 43.3  | 55.0  | 59.6  | 64.4  | 9                                  | 7                | 6    | 7.5     | 37.8 | 112   | 124   | 136   | 5    | 7    | 0         |  |  |
| 46 FT            | 31               | 33 | 12 | 9             | 6.5  | 6       | 7    | 43.3  | 55.8  | 60.5  | 65.1  | 9                                  | 7                | 6    | 7       | 37.8 | 113   | 125   | 137   | 5    | 7    | 0         |  |  |
| 48 FT            | 32               | 33 | 12 | 9             | 6.5  | 6       | 7    | 43.3  | 56.1  | 60.9  | 65.5  | 9                                  | 7                | 6    | 7       | 37.8 | 113   | 125   | 137   | 5    | 7    | 0         |  |  |
| 50 FT            | 33               | 34 | 12 | 9             | 6.5  | 6       | 7    | 43.3  | 58.4  | 63.3  | 68.0  | 9                                  | 7                | 6    | 7       | 37.8 | 114   | 126   | 138   | 5    | 6.5  | 0         |  |  |

| SPAN (S) = 14 FT |                  |    |    |               |      |         |      |       |        |        |      | HEIGHT (HT) = 13 FT OR 14 FT |      |         |       |        |        |      |      |           |  |  |  |
|------------------|------------------|----|----|---------------|------|---------|------|-------|--------|--------|------|------------------------------|------|---------|-------|--------|--------|------|------|-----------|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |         |      |       |        |        |      | BOTTOM SLAB BARS             |      |         |       |        |        |      |      | WALL BARS |  |  |  |
|                  |                  |    |    | A1 BARS       |      | J3 BARS |      |       |        |        |      | A2 BARS                      |      | J4 BARS |       |        |        |      |      | B2 BARS   |  |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1    | K2     |        | SIZE | SPA.                         | SIZE | SPA.    | C4    | K3     |        | SIZE | SPA. | G1        |  |  |  |
|                  |                  |    |    |               |      |         |      |       | HT=13' | HT=14' |      |                              |      |         |       | HT=13' | HT=14' |      |      |           |  |  |  |
| 1 FT             | 12               | 12 | 10 | 6             | 6    | 6       | 7    | 105.0 | 36.8   | 39.3   | 6    | 6                            | 6    | 6       | 105.0 | 164    | 176    | 5    | 8    | 12        |  |  |  |
| 2 FT             | 13               | 13 | 10 | 7             | 8    | 6       | 7    | 105.0 | 35.4   | 37.8   | 7    | 8                            | 6    | 6.5     | 105.0 | 165    | 177    | 5    | 8    | 12        |  |  |  |
| 2'- 4'           | 13               | 13 | 10 | 7             | 7.5  | 6       | 6.5  | 105.0 | 36.5   | 39.0   | 7    | 7                            | 6    | 6       | 105.0 | 165    | 177    | 5    | 8    | 12        |  |  |  |
| 4 FT             | 11               | 12 | 10 | 7             | 7.5  | 6       | 6.5  | 105.0 | 36.5   | 39.0   | 7    | 7                            | 6    | 6       | 105.0 | 164    | 176    | 5    | 8    | 0         |  |  |  |
| 6 FT             | 11               | 13 | 10 | 7             | 7.5  | 6       | 6    | 76.5  | 35.0   | 37.4   | 7    | 7                            | 6    | 6       | 87.3  | 165    | 177    | 5    | 8    | 0         |  |  |  |
| 8 FT             | 11               | 13 | 11 | 7             | 7.5  | 6       | 6    | 66.3  | 35.0   | 37.4   | 7    | 6.5                          | 6    | 6       | 71.6  | 165    | 177    | 5    | 7.5  | 0         |  |  |  |
| 10 FT            | 12               | 14 | 11 | 7             | 7    | 6       | 6    | 64.5  | 37.1   | 39.8   | 7    | 6                            | 6    | 6       | 68.0  | 166    | 178    | 5    | 7.5  | 0         |  |  |  |
| 12 FT            | 13               | 15 | 12 | 7             | 6.5  | 6       | 6    | 61.3  | 37.6   | 40.1   | 7    | 6                            | 6    | 6.5     | 64.8  | 167    | 179    | 5    | 7    | 0         |  |  |  |
| 14 FT            | 14               | 16 | 13 | 7             | 6.5  | 6       | 6    | 59.8  | 38.0   | 40.5   | 7    | 6                            | 6    | 6.5     | 63.4  | 168    | 180    | 5    | 6.5  | 0         |  |  |  |
| 16 FT            | 14               | 16 | 13 | 7             | 6    | 7       | 8    | 59.8  | 38.0   | 40.5   | 8    | 7.5                          | 6    | 6       | 56.1  | 168    | 180    | 5    | 7.5  | 0         |  |  |  |
| 18 FT            | 15               | 18 | 13 | 7             | 6    | 7       | 7    | 67.0  | 40.5   | 43.1   | 8    | 7.5                          | 6    | 6.5     | 56.1  | 170    | 182    | 5    | 6.5  | 0         |  |  |  |
| 20 FT            | 16               | 19 | 13 | 8             | 7    | 7       | 6.5  | 65.1  | 40.9   | 43.5   | 8    | 7                            | 6    | 6       | 56.1  | 171    | 183    | 5    | 6.5  | 0         |  |  |  |
| 22 FT            | 18               | 20 | 14 | 8             | 7    | 7       | 7    | 65.5  | 43.5   | 46.3   | 8    | 7                            | 6    | 6       | 56.4  | 172    | 184    | 5    | 6    | 0         |  |  |  |
| 24 FT            | 19               | 22 | 14 | 8             | 7    | 7       | 7    | 65.5  | 44.1   | 46.9   | 8    | 7                            | 6    | 6       | 56.4  | 174    | 186    | 5    | 6    | 0         |  |  |  |
| 26 FT            | 20               | 23 | 15 | 8             | 6.5  | 7       | 7    | 65.9  | 44.6   | 47.4   | 8    | 6.5                          | 6    | 6       | 56.8  | 175    | 187    | 6    | 8    | 0         |  |  |  |
| 28 FT            | 21               | 24 | 15 | 8             | 6.5  | 7       | 6.5  | 65.9  | 45.1   | 47.9   | 8    | 6.5                          | 6    | 6       | 56.8  | 176    | 188    | 6    | 8    | 0         |  |  |  |
| 30 FT            | 22               | 25 | 16 | 8             | 6.5  | 7       | 6.5  | 66.3  | 47.5   | 50.4   | 8    | 6.5                          | 6    | 6       | 57.0  | 177    | 189    | 6    | 8    | 0         |  |  |  |
| 32 FT            | 23               | 26 | 16 | 8             | 6    | 7       | 6    | 66.3  | 50.0   | 53.0   | 8    | 6                            | 7    | 8       | 58.9  | 178    | 190    | 6    | 8    | 0         |  |  |  |
| 34 FT            | 24               | 27 | 17 | 8             | 6    | 7       | 6    | 66.6  | 48.5   | 51.4   | 8    | 6                            | 6    | 6       | 57.4  | 179    | 191    | 6    | 7.5  | 0         |  |  |  |
| 36 FT            | 25               | 28 | 17 | 8             | 6    | 7       | 6    | 66.6  | 53.0   | 56.1   | 8    | 6                            | 7    | 8       | 59.3  | 180    | 192    | 6    | 7.5  | 0         |  |  |  |
| 38 FT            | 26               | 29 | 18 | 9             | 7.5  | 7       | 6    | 67.0  | 51.5   | 54.5   | 8    | 6                            | 6    | 6       | 57.6  | 181    | 193    | 6    | 7    | 0         |  |  |  |
| 40 FT            | 27               | 30 | 18 | 9             | 7    | 7       | 6    | 67.0  | 54.1   | 57.3   | 8    | 6                            | 7    | 8       | 61.4  | 182    | 194    | 6    | 7    | 0         |  |  |  |
| 42 FT            | 28               | 31 | 19 | 9             | 7    | 7       | 6    | 67.4  | 52.5   | 55.5   | 9    | 7.5                          | 6    | 6       | 58.0  | 183    | 195    | 6    | 6.5  | 0         |  |  |  |
| 44 FT            | 29               | 32 | 19 | 9             | 7    | 7       | 6    | 67.4  | 57.3   | 60.5   | 9    | 7                            | 7    | 8       | 61.8  | 184    | 196    | 6    | 6.5  | 0         |  |  |  |
| 46 FT            | 30               | 33 | 20 | 9             | 7    | 7       | 6.5  | 67.6  | 55.6   | 58.8   | 9    | 7                            | 6    | 6       | 58.3  | 185    | 197    | 6    | 6.5  | 0         |  |  |  |
| 48 FT            | 31               | 34 | 20 | 9             | 6.5  | 7       | 6    | 67.6  | 58.4   | 61.5   | 9    | 7                            | 7    | 8       | 62.0  | 186    | 198    | 6    | 6.5  | 0         |  |  |  |
| 50 FT            | 32               | 35 | 21 | 9             | 6.5  | 7       | 6.5  | 69.9  | 56.6   | 59.8   | 9    | 7                            | 6    | 6       | 58.6  | 187    | 199    | 6    | 6    | 0         |  |  |  |

| SPAN (S) = 15 FT |                     |    |    |               |      |         |      |       |       |       |         |      |                  |      | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |      |       |         |        |      |      |           |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|---------------|------|---------|------|-------|-------|-------|---------|------|------------------|------|-------------------------------------|------|-------|---------|--------|------|------|-----------|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    | TOP SLAB BARS |      |         |      |       |       |       |         |      | BOTTOM SLAB BARS |      |                                     |      |       |         |        |      |      | WALL BARS |  |  |  |  |  |  |  |
|                  |                     |    |    | A1 BARS       |      | J3 BARS |      |       |       |       | A2 BARS |      | J4 BARS          |      |                                     |      |       | B2 BARS |        |      |      |           |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1    | K2    |       |         | SIZE | SPA.             | SIZE | SPA.                                | C4   | K3    |         |        | SIZE | SPA. | G1        |  |  |  |  |  |  |  |
|                  |                     |    |    |               |      |         |      |       | HT=8' | HT=9' | HT=10'  |      |                  |      |                                     |      | HT=8' | HT=9'   | HT=10' |      |      |           |  |  |  |  |  |  |  |
| 1 FT             | 12                  | 13 | 8  | 7             | 7    | 6       | 7    | 109.0 | 32.5  | 35.9  | 39.3    | 6    | 6                | 6    | 7                                   | 82.8 | 105   | 117     | 129    | 5    | 12   | 1         |  |  |  |  |  |  |  |
| 2 FT             | 12                  | 13 | 8  | 7             | 6.5  | 6       | 6.5  | 109.0 | 33.6  | 37.1  | 40.6    | 7    | 7.5              | 6    | 6.5                                 | 65.8 | 105   | 117     | 129    | 5    | 12   | 12        |  |  |  |  |  |  |  |
| 2' - 4'          | 12                  | 13 | 8  | 7             | 6    | 6       | 6    | 109.0 | 35.4  | 39.0  | 42.8    | 7    | 7                | 6    | 6                                   | 65.8 | 105   | 117     | 129    | 5    | 12   | 12        |  |  |  |  |  |  |  |
| 4 FT             | 11                  | 12 | 8  | 7             | 6    | 6       | 6    | 52.6  | 35.4  | 39.0  | 42.8    | 7    | 7                | 6    | 6                                   | 52.6 | 104   | 116     | 128    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 6 FT             | 11                  | 12 | 9  | 7             | 6.5  | 6       | 6    | 51.0  | 35.4  | 39.0  | 42.8    | 7    | 6.5              | 6    | 6                                   | 49.1 | 104   | 116     | 128    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 8 FT             | 11                  | 12 | 9  | 7             | 6    | 7       | 6    | 51.0  | 35.4  | 39.0  | 42.8    | 8    | 7.5              | 6    | 6                                   | 47.3 | 104   | 116     | 128    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 10 FT            | 12                  | 14 | 9  | 8             | 7.5  | 7       | 6    | 49.1  | 32.8  | 36.1  | 39.5    | 8    | 7                | 6    | 7                                   | 43.5 | 106   | 118     | 130    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 12 FT            | 13                  | 15 | 9  | 8             | 6.5  | 7       | 6.5  | 47.3  | 34.5  | 38.0  | 41.5    | 8    | 6.5              | 6    | 7                                   | 41.6 | 107   | 119     | 131    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 14 FT            | 14                  | 17 | 9  | 8             | 6.5  | 7       | 6.5  | 45.4  | 34.1  | 37.5  | 40.9    | 8    | 6.5              | 6    | 8                                   | 39.8 | 109   | 121     | 133    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 16 FT            | 14                  | 17 | 9  | 8             | 6    | 7       | 6    | 43.5  | 34.1  | 37.5  | 40.9    | 8    | 6.5              | 6    | 8                                   | 37.8 | 109   | 121     | 133    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 18 FT            | 16                  | 19 | 9  | 8             | 6    | 7       | 7    | 49.1  | 36.5  | 40.0  | 43.5    | 8    | 6.5              | 6    | 8                                   | 37.8 | 111   | 123     | 135    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 20 FT            | 17                  | 20 | 9  | 9             | 7.5  | 7       | 6    | 49.1  | 37.1  | 40.6  | 44.1    | 8    | 6.5              | 6    | 7.5                                 | 37.8 | 112   | 124     | 136    | 5    | 11   | 0         |  |  |  |  |  |  |  |
| 22 FT            | 19                  | 21 | 9  | 9             | 7.5  | 7       | 7    | 49.1  | 43.3  | 47.3  | 51.1    | 8    | 6                | 6    | 7                                   | 37.8 | 113   | 125     | 137    | 5    | 9    | 0         |  |  |  |  |  |  |  |
| 24 FT            | 21                  | 23 | 10 | 8             | 6    | 6       | 6    | 43.8  | 41.9  | 45.6  | 49.3    | 8    | 6                | 6    | 8                                   | 38.0 | 115   | 127     | 139    | 5    | 9    | 0         |  |  |  |  |  |  |  |
| 26 FT            | 22                  | 24 | 11 | 9             | 7.5  | 6       | 6    | 43.9  | 42.5  | 46.3  | 49.9    | 8    | 6                | 6    | 8                                   | 38.3 | 116   | 128     | 140    | 5    | 10.5 | 0         |  |  |  |  |  |  |  |
| 28 FT            | 23                  | 25 | 11 | 9             | 7    | 6       | 6    | 43.9  | 43.1  | 46.8  | 50.5    | 8    | 6                | 6    | 8                                   | 38.3 | 117   | 129     | 141    | 5    | 9    | 0         |  |  |  |  |  |  |  |
| 30 FT            | 24                  | 26 | 11 | 9             | 7    | 7       | 7.5  | 49.6  | 49.4  | 53.5  | 57.8    | 9    | 7.5              | 6    | 7                                   | 38.3 | 118   | 130     | 142    | 5    | 8    | 0         |  |  |  |  |  |  |  |
| 32 FT            | 26                  | 28 | 12 | 9             | 7    | 6       | 6.5  | 46.1  | 46.4  | 50.3  | 54.1    | 8    | 6                | 6    | 8.5                                 | 38.4 | 120   | 132     | 144    | 5    | 8    | 0         |  |  |  |  |  |  |  |
| 34 FT            | 27                  | 29 | 12 | 9             | 7    | 6       | 6.5  | 46.1  | 51.5  | 55.6  | 59.9    | 9    | 7.5              | 6    | 8                                   | 38.4 | 121   | 133     | 145    | 5    | 7.5  | 0         |  |  |  |  |  |  |  |
| 36 FT            | 28                  | 30 | 12 | 9             | 6.5  | 6       | 6.5  | 46.1  | 52.1  | 56.4  | 60.5    | 9    | 7                | 6    | 8                                   | 38.4 | 122   | 134     | 146    | 5    | 7    | 0         |  |  |  |  |  |  |  |
| 38 FT            | 29                  | 31 | 12 | 9             | 6.5  | 6       | 6    | 46.1  | 54.4  | 58.6  | 63.0    | 9    | 7                | 6    | 7.5                                 | 38.4 | 123   | 135     | 147    | 5    | 7    | 0         |  |  |  |  |  |  |  |
| 40 FT            | 30                  | 32 | 13 | 9             | 6.5  | 6       | 6.5  | 46.4  | 55.1  | 59.4  | 63.8    | 9    | 7                | 6    | 7.5                                 | 40.5 | 124   | 136     | 148    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 42 FT            | 31                  | 33 | 13 | 9             | 6.5  | 6       | 6.5  | 46.4  | 55.8  | 60.1  | 64.5    | 9    | 7                | 6    | 7                                   | 40.5 | 125   | 137     | 149    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 44 FT            | 32                  | 34 | 13 | 9             | 6    | 6       | 6.5  | 46.4  | 56.5  | 60.9  | 65.1    | 9    | 6.5              | 6    | 7                                   | 40.5 | 126   | 138     | 150    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 46 FT            | 33                  | 35 | 13 | 9             | 6    | 6       | 6.5  | 46.4  | 57.3  | 61.5  | 65.9    | 9    | 6.5              | 6    | 6.5                                 | 40.5 | 127   | 139     | 151    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 48 FT            | 34                  | 36 | 13 | 9             | 6    | 6       | 6.5  | 46.4  | 59.6  | 64.0  | 68.5    | 9    | 6.5              | 6    | 6.5                                 | 40.5 | 128   | 140     | 152    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 50 FT            | 35                  | 36 | 13 | 9             | 6    | 6       | 6.5  | 46.4  | 60.0  | 64.4  | 68.9    | 9    | 6.5              | 6    | 6                                   | 40.5 | 128   | 140     | 152    | 5    | 6    | 0         |  |  |  |  |  |  |  |

| SPAN (S) = 15 FT |                  |    |    |               |      |      |         |       |        |        |        |      |                  |      | HEIGHT (HT) = 14 FT OR 15 FT OR 16 FT |         |        |        |        |      |      |           |  |  |  |  |  |  |  |
|------------------|------------------|----|----|---------------|------|------|---------|-------|--------|--------|--------|------|------------------|------|---------------------------------------|---------|--------|--------|--------|------|------|-----------|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |      |         |       |        |        |        |      | BOTTOM SLAB BARS |      |                                       |         |        |        |        |      |      | WALL BARS |  |  |  |  |  |  |  |
|                  |                  |    |    | A1 BARS       |      |      | J3 BARS |       |        |        |        |      | A2 BARS          |      |                                       | J4 BARS |        |        |        |      |      | B2 BARS   |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE | SPA.    | C1    | K2     |        |        | SIZE | SPA.             | SIZE | SPA.                                  | C4      | K3     |        |        | SIZE | SPA. | G1        |  |  |  |  |  |  |  |
|                  |                  |    |    |               |      |      |         |       | HT=14' | HT=15' | HT=16' |      |                  |      |                                       |         | HT=14' | HT=15' | HT=16' |      |      |           |  |  |  |  |  |  |  |
| 1 FT             | 13               | 14 | 11 | 7             | 8    | 6    | 7.5     | 112.8 | 36.1   | 38.4   | 40.6   | 7    | 8                | 6    | 7                                     | 112.8   | 178    | 190    | 202    | 5    | 7.5  | 12        |  |  |  |  |  |  |  |
| 2 FT             | 13               | 14 | 11 | 7             | 7.5  | 6    | 6.5     | 112.8 | 38.0   | 40.4   | 42.8   | 7    | 7.5              | 6    | 6.5                                   | 112.8   | 178    | 190    | 202    | 5    | 7    | 12        |  |  |  |  |  |  |  |
| 2'- 4'           | 13               | 14 | 11 | 7             | 7    | 6    | 6.5     | 112.8 | 38.0   | 40.4   | 42.8   | 7    | 7                | 6    | 6                                     | 112.8   | 178    | 190    | 202    | 5    | 6.5  | 12        |  |  |  |  |  |  |  |
| 4 FT             | 12               | 13 | 11 | 7             | 7    | 6    | 6.5     | 112.8 | 37.6   | 40.0   | 42.4   | 7    | 7                | 6    | 6                                     | 112.8   | 177    | 189    | 201    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 6 FT             | 12               | 13 | 12 | 7             | 7.5  | 6    | 6.5     | 92.1  | 37.6   | 40.0   | 42.4   | 7    | 6.5              | 6    | 6                                     | 97.9    | 177    | 189    | 201    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 8 FT             | 12               | 14 | 13 | 7             | 7.5  | 6    | 6       | 77.3  | 37.8   | 40.3   | 42.6   | 7    | 6.5              | 6    | 6                                     | 84.9    | 178    | 190    | 202    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 10 FT            | 13               | 15 | 13 | 7             | 6.5  | 6    | 6       | 73.4  | 38.3   | 40.6   | 43.0   | 7    | 6                | 6    | 6                                     | 81.0    | 179    | 191    | 203    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 12 FT            | 14               | 16 | 14 | 7             | 6.5  | 7    | 8       | 73.8  | 38.6   | 41.0   | 43.4   | 8    | 7.5              | 6    | 6                                     | 75.6    | 180    | 192    | 204    | 5    | 6    | 0         |  |  |  |  |  |  |  |
| 14 FT            | 15               | 17 | 14 | 7             | 6    | 7    | 7       | 81.5  | 41.0   | 43.5   | 46.0   | 8    | 7                | 7    | 7.5                                   | 75.6    | 181    | 193    | 205    | 5    | 6    | 0         |  |  |  |  |  |  |  |
| 16 FT            | 16               | 18 | 15 | 8             | 7.5  | 7    | 7       | 80.0  | 45.3   | 48.1   | 50.9   | 8    | 7                | 7    | 7                                     | 74.1    | 182    | 194    | 206    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 18 FT            | 16               | 19 | 15 | 8             | 7    | 7    | 7       | 74.1  | 41.6   | 44.1   | 46.6   | 8    | 7                | 7    | 7.5                                   | 70.3    | 183    | 195    | 207    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 20 FT            | 17               | 20 | 15 | 8             | 7    | 7    | 6       | 74.1  | 46.0   | 48.8   | 51.5   | 8    | 6.5              | 7    | 7                                     | 68.3    | 184    | 196    | 208    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 22 FT            | 19               | 21 | 15 | 8             | 6.5  | 7    | 6       | 74.1  | 50.8   | 53.8   | 56.8   | 8    | 6                | 7    | 6                                     | 68.3    | 185    | 197    | 209    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 24 FT            | 20               | 23 | 16 | 8             | 6.5  | 7    | 6       | 74.5  | 47.4   | 50.1   | 52.9   | 8    | 6                | 7    | 6.5                                   | 68.6    | 187    | 199    | 211    | 6    | 8    | 0         |  |  |  |  |  |  |  |
| 26 FT            | 21               | 24 | 17 | 8             | 6    | 7    | 6       | 72.9  | 49.9   | 52.8   | 55.6   | 8    | 6                | 7    | 7                                     | 69.0    | 188    | 200    | 212    | 6    | 7.5  | 0         |  |  |  |  |  |  |  |
| 28 FT            | 23               | 25 | 17 | 8             | 6    | 7    | 6       | 72.9  | 54.9   | 58.0   | 61.1   | 8    | 6                | 7    | 6                                     | 69.0    | 189    | 201    | 213    | 6    | 7.5  | 0         |  |  |  |  |  |  |  |
| 30 FT            | 24               | 27 | 18 | 8             | 6    | 7    | 6       | 73.3  | 51.4   | 54.3   | 57.1   | 8    | 6                | 7    | 6.5                                   | 69.3    | 191    | 203    | 215    | 6    | 7    | 0         |  |  |  |  |  |  |  |
| 32 FT            | 25               | 28 | 19 | 8             | 6    | 7    | 6       | 73.6  | 49.6   | 52.5   | 55.3   | 8    | 6                | 7    | 7                                     | 69.6    | 192    | 204    | 216    | 6    | 6.5  | 0         |  |  |  |  |  |  |  |
| 34 FT            | 26               | 29 | 20 | 8             | 6    | 7    | 6       | 74.0  | 52.4   | 55.3   | 58.1   | 9    | 7.5              | 7    | 7                                     | 68.0    | 193    | 205    | 217    | 6    | 6.5  | 0         |  |  |  |  |  |  |  |
| 36 FT            | 27               | 30 | 21 | 9             | 7.5  | 7    | 6       | 74.4  | 52.8   | 55.6   | 58.5   | 9    | 7                | 7    | 7.5                                   | 68.4    | 194    | 206    | 218    | 6    | 6.5  | 0         |  |  |  |  |  |  |  |
| 38 FT            | 28               | 31 | 21 | 9             | 7    | 7    | 6       | 74.4  | 55.5   | 58.5   | 61.5   | 9    | 7                | 7    | 7                                     | 68.4    | 195    | 207    | 219    | 6    | 6    | 0         |  |  |  |  |  |  |  |
| 40 FT            | 29               | 32 | 22 | 9             | 7    | 7    | 6       | 74.8  | 60.5   | 63.8   | 67.0   | 9    | 7                | 7    | 7                                     | 68.6    | 196    | 208    | 220    | 6    | 6    | 0         |  |  |  |  |  |  |  |
| 42 FT            | 30               | 33 | 23 | 9             | 7    | 7    | 6       | 77.1  | 61.0   | 64.3   | 67.5   | 9    | 7                | 7    | 7                                     | 69.0    | 197    | 209    | 221    | 6    | 6    | 0         |  |  |  |  |  |  |  |
| 44 FT            | 31               | 34 | 24 | 9             | 6.5  | 7    | 6       | 77.5  | 61.5   | 64.8   | 68.0   | 9    | 6.5              | 7    | 7                                     | 69.4    | 198    | 210    | 222    | 6    | 6    | 0         |  |  |  |  |  |  |  |
| 46 FT            | 32               | 35 | 24 | 9             | 6.5  | 7    | 6       | 77.5  | 62.1   | 65.4   | 68.6   | 9    | 6.5              | 7    | 7                                     | 69.4    | 199    | 211    | 223    | 7    | 8    | 0         |  |  |  |  |  |  |  |
| 48 FT            | 33               | 36 | 25 | 9             | 6.5  | 7    | 6       | 77.9  | 65.0   | 68.4   | 71.6   | 9    | 6.5              | 7    | 7                                     | 69.8    | 200    | 212    | 224    | 7    | 8    | 0         |  |  |  |  |  |  |  |
| 50 FT            | 34               | 37 | 25 | 9             | 6.5  | 7    | 6       | 77.9  | 65.5   | 68.9   | 72.3   | 9    | 6.5              | 7    | 7                                     | 71.8    | 201    | 213    | 225    | 7    | 7.5  | 0         |  |  |  |  |  |  |  |



| SPAN (S) = 16 FT |                  |    |    |               |      |         |      |       |       |       |         |      |                  |      |      | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |       |         |        |      |      |           |  |  |  |  |  |  |  |
|------------------|------------------|----|----|---------------|------|---------|------|-------|-------|-------|---------|------|------------------|------|------|-------------------------------------|-------|---------|--------|------|------|-----------|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    | TOP SLAB BARS |      |         |      |       |       |       |         |      | BOTTOM SLAB BARS |      |      |                                     |       |         |        |      |      | WALL BARS |  |  |  |  |  |  |  |
|                  |                  |    |    | A1 BARS       |      | J3 BARS |      |       |       |       | A2 BARS |      | J4 BARS          |      |      |                                     |       | B2 BARS |        |      |      |           |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | SIZE          | SPA. | SIZE    | SPA. | C1    | K2    |       |         | SIZE | SPA.             | SIZE | SPA. | C4                                  | K3    |         |        | SIZE | SPA. | G1        |  |  |  |  |  |  |  |
|                  |                  |    |    |               |      |         |      |       | HT=8' | HT=9' | HT=10'  |      |                  |      |      |                                     | HT=8' | HT=9'   | HT=10' |      |      |           |  |  |  |  |  |  |  |
| 1 FT             | 12               | 13 | 8  | 7             | 6.5  | 6       | 6.5  | 116.0 | 37.1  | 41.0  | 44.8    | 7    | 7.5              | 6    | 6.5  | 76.0                                | 105   | 117     | 129    | 5    | 12   | 1         |  |  |  |  |  |  |  |
| 2 FT             | 12               | 13 | 8  | 7             | 6    | 6       | 6    | 116.0 | 37.1  | 41.0  | 44.8    | 7    | 7                | 6    | 6    | 64.0                                | 105   | 117     | 129    | 5    | 12   | 12        |  |  |  |  |  |  |  |
| 2'- 4'           | 12               | 13 | 9  | 7             | 6    | 6       | 6    | 116.0 | 37.1  | 41.0  | 44.8    | 7    | 6.5              | 6    | 6    | 64.0                                | 105   | 117     | 129    | 5    | 12   | 12        |  |  |  |  |  |  |  |
| 4 FT             | 12               | 12 | 9  | 7             | 6.5  | 6       | 6.5  | 54.3  | 36.8  | 40.6  | 44.5    | 7    | 6.5              | 6    | 6    | 54.3                                | 104   | 116     | 128    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 6 FT             | 12               | 12 | 9  | 7             | 6    | 6       | 6.5  | 50.3  | 36.8  | 40.6  | 44.5    | 7    | 6                | 6    | 6    | 50.3                                | 104   | 116     | 128    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 8 FT             | 12               | 13 | 9  | 8             | 7.5  | 7       | 6.5  | 50.3  | 37.1  | 41.0  | 44.8    | 8    | 7                | 6    | 6    | 46.3                                | 105   | 117     | 129    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 10 FT            | 13               | 14 | 9  | 8             | 6.5  | 7       | 6.5  | 48.3  | 37.8  | 41.6  | 45.5    | 8    | 6.5              | 6    | 6    | 44.3                                | 106   | 118     | 130    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 12 FT            | 14               | 16 | 9  | 8             | 6.5  | 7       | 6.5  | 46.3  | 35.1  | 38.6  | 42.0    | 8    | 6.5              | 6    | 7.5  | 40.3                                | 108   | 120     | 132    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 14 FT            | 15               | 18 | 9  | 8             | 6    | 7       | 6    | 52.3  | 36.0  | 39.5  | 42.9    | 8    | 6                | 6    | 8    | 38.3                                | 110   | 122     | 134    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 16 FT            | 16               | 19 | 9  | 9             | 7    | 7       | 6    | 50.3  | 36.5  | 40.0  | 43.5    | 8    | 6                | 6    | 7.5  | 38.3                                | 111   | 123     | 135    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 18 FT            | 17               | 20 | 9  | 9             | 7    | 7       | 6.5  | 50.3  | 37.1  | 40.6  | 44.1    | 8    | 6                | 6    | 8    | 38.3                                | 112   | 124     | 136    | 5    | 12   | 0         |  |  |  |  |  |  |  |
| 20 FT            | 19               | 21 | 9  | 9             | 7    | 7       | 7    | 50.3  | 39.3  | 42.9  | 46.5    | 8    | 6                | 6    | 7.5  | 38.3                                | 113   | 125     | 137    | 5    | 10.5 | 0         |  |  |  |  |  |  |  |
| 22 FT            | 20               | 23 | 9  | 9             | 6.5  | 7       | 6.5  | 50.3  | 40.3  | 43.8  | 47.4    | 8    | 6                | 6    | 7.5  | 38.3                                | 115   | 127     | 139    | 5    | 9    | 0         |  |  |  |  |  |  |  |
| 24 FT            | 22               | 24 | 10 | 9             | 7    | 7       | 7.5  | 50.5  | 42.5  | 46.3  | 49.9    | 9    | 7.5              | 6    | 7.5  | 38.4                                | 116   | 128     | 140    | 5    | 9.5  | 0         |  |  |  |  |  |  |  |
| 26 FT            | 23               | 25 | 10 | 9             | 6.5  | 7       | 7    | 50.5  | 47.3  | 51.4  | 55.4    | 9    | 7                | 6    | 7    | 38.4                                | 117   | 129     | 141    | 5    | 8.5  | 0         |  |  |  |  |  |  |  |
| 28 FT            | 25               | 27 | 11 | 9             | 6.5  | 6       | 6    | 46.8  | 45.8  | 49.6  | 53.5    | 9    | 7                | 6    | 8    | 40.6                                | 119   | 131     | 143    | 5    | 8.5  | 0         |  |  |  |  |  |  |  |
| 30 FT            | 26               | 28 | 11 | 9             | 6.5  | 6       | 6    | 46.8  | 46.4  | 50.3  | 54.1    | 9    | 7                | 6    | 8    | 40.6                                | 120   | 132     | 144    | 5    | 7.5  | 0         |  |  |  |  |  |  |  |
| 32 FT            | 28               | 29 | 11 | 9             | 6.5  | 6       | 6.5  | 46.8  | 53.3  | 57.6  | 61.9    | 9    | 7                | 6    | 7    | 40.6                                | 121   | 133     | 145    | 5    | 7.5  | 0         |  |  |  |  |  |  |  |
| 34 FT            | 29               | 31 | 12 | 9             | 6.5  | 6       | 6.5  | 46.9  | 54.4  | 58.6  | 63.0    | 9    | 7                | 6    | 7.5  | 40.8                                | 123   | 135     | 147    | 5    | 7    | 0         |  |  |  |  |  |  |  |
| 36 FT            | 30               | 32 | 12 | 9             | 6    | 6       | 6.5  | 46.9  | 55.1  | 59.4  | 63.8    | 9    | 6.5              | 6    | 7.5  | 40.8                                | 124   | 136     | 148    | 5    | 7    | 0         |  |  |  |  |  |  |  |
| 38 FT            | 31               | 33 | 12 | 9             | 6    | 6       | 6.5  | 46.9  | 55.8  | 60.1  | 64.5    | 9    | 6.5              | 6    | 7    | 40.8                                | 125   | 137     | 149    | 5    | 7    | 0         |  |  |  |  |  |  |  |
| 40 FT            | 32               | 34 | 12 | 9             | 6    | 6       | 6.5  | 46.9  | 56.5  | 60.9  | 65.1    | 9    | 6.5              | 6    | 7    | 40.8                                | 126   | 138     | 150    | 5    | 7    | 0         |  |  |  |  |  |  |  |
| 42 FT            | 33               | 35 | 12 | 9             | 6    | 6       | 6    | 46.9  | 57.3  | 61.5  | 65.9    | 9    | 6.5              | 6    | 6.5  | 40.8                                | 127   | 139     | 151    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 44 FT            | 34               | 36 | 13 | 10            | 7.5  | 6       | 6.5  | 47.1  | 59.6  | 64.0  | 68.5    | 9    | 6                | 6    | 6.5  | 41.0                                | 128   | 140     | 152    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 46 FT            | 35               | 37 | 13 | 10            | 7    | 6       | 6    | 47.1  | 60.3  | 64.8  | 69.3    | 9    | 6                | 6    | 6.5  | 41.0                                | 129   | 141     | 153    | 5    | 6.5  | 0         |  |  |  |  |  |  |  |
| 48 FT            | 36               | 38 | 13 | 10            | 7    | 6       | 6.5  | 47.1  | 61.0  | 65.5  | 69.9    | 9    | 6                | 6    | 6    | 41.0                                | 130   | 142     | 154    | 5    | 6    | 0         |  |  |  |  |  |  |  |
| 50 FT            | 37               | 39 | 13 | 10            | 7    | 6       | 6    | 47.1  | 61.8  | 66.3  | 70.6    | 9    | 6                | 6    | 6    | 41.0                                | 131   | 143     | 155    | 6    | 8.5  | 0         |  |  |  |  |  |  |  |

| SPAN (S) = 16 FT |                  |      |      |               |     |        |         |        |      |      |      |      |                  |        |        | HEIGHT (HT) = 14 FT OR 15 FT OR 16 FT |      |      |     |   |     |           |  |  |  |  |  |
|------------------|------------------|------|------|---------------|-----|--------|---------|--------|------|------|------|------|------------------|--------|--------|---------------------------------------|------|------|-----|---|-----|-----------|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      | TOP SLAB BARS |     |        |         |        |      |      |      |      | BOTTOM SLAB BARS |        |        |                                       |      |      |     |   |     | WALL BARS |  |  |  |  |  |
|                  |                  |      |      | A1 BARS       |     |        | J3 BARS |        |      |      |      |      | A2 BARS          |        |        | J4 BARS                               |      |      |     |   |     | B2 BARS   |  |  |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA.          | C1  | K2     |         |        | SIZE | SPA. | SIZE | SPA. | C4               | K3     |        |                                       | SIZE | SPA. | G1  |   |     |           |  |  |  |  |  |
|                  |                  |      |      |               |     | HT=14' | HT=15'  | HT=16' |      |      |      |      |                  | HT=14' | HT=15' | HT=16'                                |      |      |     |   |     |           |  |  |  |  |  |
| 1 FT             | 13               | 14   | 11   | 7             | 7.5 | 6      | 7       | 117.8  | 38.0 | 40.4 | 42.8 | 7    | 7.5              | 6      | 6.5    | 117.8                                 | 178  | 190  | 202 | 5 | 7.5 | 12        |  |  |  |  |  |
| 2 FT             | 13               | 14   | 11   | 7             | 7   | 7      | 7.5     | 121.8  | 38.0 | 40.4 | 42.8 | 7    | 7                | 6      | 6.5    | 117.8                                 | 178  | 190  | 202 | 5 | 7   | 12        |  |  |  |  |  |
| 2'- 4'           | 13               | 14   | 11   | 7             | 6.5 | 7      | 7.5     | 121.8  | 38.0 | 40.4 | 42.8 | 7    | 6.5              | 6      | 6      | 117.8                                 | 178  | 190  | 202 | 5 | 6.5 | 12        |  |  |  |  |  |
| 4 FT             | 12               | 14   | 11   | 7             | 6.5 | 6      | 6       | 117.8  | 37.8 | 40.3 | 42.6 | 7    | 6.5              | 6      | 6      | 117.8                                 | 178  | 190  | 202 | 5 | 6.5 | 0         |  |  |  |  |  |
| 6 FT             | 12               | 14   | 12   | 7             | 6.5 | 6      | 6       | 83.6   | 37.8 | 40.3 | 42.6 | 7    | 6.5              | 6      | 6      | 95.9                                  | 178  | 190  | 202 | 5 | 7   | 0         |  |  |  |  |  |
| 8 FT             | 12               | 14   | 13   | 7             | 6.5 | 7      | 6.5     | 77.9   | 37.8 | 40.3 | 42.6 | 7    | 6                | 6      | 6      | 80.0                                  | 178  | 190  | 202 | 5 | 6.5 | 0         |  |  |  |  |  |
| 10 FT            | 13               | 16   | 13   | 7             | 6   | 7      | 6.5     | 75.9   | 38.4 | 40.8 | 43.3 | 8    | 7.5              | 6      | 6      | 77.9                                  | 180  | 192  | 204 | 5 | 6.5 | 0         |  |  |  |  |  |
| 12 FT            | 14               | 17   | 14   | 7             | 6   | 7      | 6.5     | 72.1   | 40.8 | 43.3 | 45.8 | 8    | 7                | 7      | 8      | 76.3                                  | 181  | 193  | 205 | 5 | 6   | 0         |  |  |  |  |  |
| 14 FT            | 16               | 18   | 14   | 8             | 7   | 7      | 6.5     | 78.3   | 45.3 | 48.1 | 50.9 | 8    | 6.5              | 7      | 7      | 74.1                                  | 182  | 194  | 206 | 5 | 6   | 0         |  |  |  |  |  |
| 16 FT            | 17               | 19   | 15   | 8             | 7   | 7      | 6.5     | 78.6   | 47.8 | 50.6 | 53.5 | 8    | 6.5              | 7      | 6.5    | 72.5                                  | 183  | 195  | 207 | 6 | 8   | 0         |  |  |  |  |  |
| 18 FT            | 17               | 20   | 15   | 8             | 6.5 | 7      | 6.5     | 72.5   | 42.0 | 44.5 | 47.0 | 8    | 6                | 7      | 7.5    | 66.3                                  | 184  | 196  | 208 | 6 | 8   | 0         |  |  |  |  |  |
| 20 FT            | 19               | 21   | 15   | 8             | 6.5 | 7      | 6       | 72.5   | 50.8 | 53.8 | 56.8 | 8    | 6                | 7      | 6.5    | 66.3                                  | 185  | 197  | 209 | 6 | 8   | 0         |  |  |  |  |  |
| 22 FT            | 20               | 23   | 16   | 8             | 6   | 7      | 6       | 72.8   | 45.4 | 48.0 | 50.6 | 8    | 6                | 7      | 7      | 66.5                                  | 187  | 199  | 211 | 6 | 8   | 0         |  |  |  |  |  |
| 24 FT            | 22               | 24   | 16   | 8             | 6   | 7      | 6       | 72.8   | 52.3 | 55.3 | 58.3 | 9    | 7.5              | 7      | 6.5    | 66.5                                  | 188  | 200  | 212 | 6 | 8   | 0         |  |  |  |  |  |
| 26 FT            | 23               | 26   | 17   | 8             | 6   | 7      | 6       | 73.1   | 50.9 | 53.8 | 56.6 | 9    | 7.5              | 7      | 7      | 66.9                                  | 190  | 202  | 214 | 6 | 7.5 | 0         |  |  |  |  |  |
| 28 FT            | 24               | 27   | 18   | 9             | 7   | 7      | 6       | 73.5   | 51.4 | 54.3 | 57.1 | 9    | 7                | 7      | 7      | 67.3                                  | 191  | 203  | 215 | 6 | 7   | 0         |  |  |  |  |  |
| 30 FT            | 26               | 28   | 18   | 9             | 7   | 7      | 6       | 73.5   | 56.4 | 59.5 | 62.6 | 9    | 7                | 7      | 6.5    | 67.3                                  | 192  | 204  | 216 | 6 | 7   | 0         |  |  |  |  |  |
| 32 FT            | 27               | 30   | 19   | 9             | 7   | 7      | 6       | 73.9   | 55.0 | 58.0 | 61.0 | 9    | 7                | 7      | 7      | 67.5                                  | 194  | 206  | 218 | 6 | 6.5 | 0         |  |  |  |  |  |
| 34 FT            | 28               | 31   | 20   | 9             | 7   | 7      | 6       | 74.3   | 55.5 | 58.5 | 61.5 | 9    | 7                | 7      | 7      | 67.9                                  | 195  | 207  | 219 | 6 | 6.5 | 0         |  |  |  |  |  |
| 36 FT            | 29               | 32   | 21   | 9             | 6.5 | 7      | 6       | 74.5   | 53.8 | 56.6 | 59.5 | 9    | 6.5              | 7      | 7      | 68.1                                  | 196  | 208  | 220 | 6 | 6.5 | 0         |  |  |  |  |  |
| 38 FT            | 30               | 33   | 22   | 9             | 6.5 | 7      | 6       | 74.9   | 61.0 | 64.3 | 67.5 | 9    | 6.5              | 7      | 7      | 68.5                                  | 197  | 209  | 221 | 6 | 6.5 | 0         |  |  |  |  |  |
| 40 FT            | 31               | 34   | 22   | 9             | 6.5 | 7      | 6       | 74.9   | 61.5 | 64.8 | 68.0 | 9    | 6.5              | 7      | 7      | 68.5                                  | 198  | 210  | 222 | 6 | 6   | 0         |  |  |  |  |  |
| 42 FT            | 32               | 35   | 23   | 9             | 6.5 | 7      | 6       | 75.3   | 62.1 | 65.4 | 68.6 | 9    | 6.5              | 7      | 7      | 68.8                                  | 199  | 211  | 223 | 6 | 6   | 0         |  |  |  |  |  |
| 44 FT            | 34               | 36   | 23   | 9             | 6   | 7      | 6       | 75.3   | 65.3 | 68.6 | 72.0 | 9    | 6                | 7      | 6.5    | 68.8                                  | 200  | 212  | 224 | 7 | 8   | 0         |  |  |  |  |  |
| 46 FT            | 35               | 37   | 24   | 9             | 6   | 7      | 6       | 75.6   | 65.8 | 69.1 | 72.5 | 9    | 6                | 7      | 6.5    | 69.1                                  | 201  | 213  | 225 | 6 | 6   | 0         |  |  |  |  |  |
| 48 FT            | 36               | 38   | 24   | 9             | 6   | 7      | 6       | 75.6   | 66.4 | 69.8 | 73.1 | 9    | 6                | 7      | 7      | 69.1                                  | 202  | 214  | 226 | 7 | 7.5 | 0         |  |  |  |  |  |
| 50 FT            | 37               | 39   | 25   | 9             | 6   | 7      | 6       | 76.0   | 69.3 | 72.8 | 76.3 | 9    | 6                | 7      | 7      | 69.5                                  | 203  | 215  | 227 | 7 | 7.5 | 0         |  |  |  |  |  |

| AREA OF STEEL REQUIRED FOR J5 BARS IN WINGS (SQ. IN./FT.)<br>WALL HEIGHT VS. WALL THICKNESS |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------------------------------------------------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ⓢ Backfill Slope = 2:1                                                                      |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Wall Thickness<br>TX (in.)                                                                  | Wall Height (ft.) |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                                                                             | 5                 | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    |
| 8                                                                                           | 0.168             | 0.168 | 0.197 | 0.291 | 0.414 | 0.429 | 0.578 | 0.766 | 1.003 |       |       |       |       |       |       |       |
| 9                                                                                           | 0.168             | 0.168 | 0.168 | 0.244 | 0.346 | 0.456 | 0.477 | 0.626 | 0.809 | 1.034 | 1.312 |       |       |       |       |       |
| 10                                                                                          | 0.168             | 0.168 | 0.168 | 0.211 | 0.298 | 0.407 | 0.487 | 0.532 | 0.683 | 0.864 | 1.084 | 1.349 |       |       |       |       |
| 11                                                                                          | 0.168             | 0.168 | 0.168 | 0.185 | 0.261 | 0.357 | 0.417 | 0.520 | 0.592 | 0.746 | 0.929 | 1.147 | 1.405 |       |       |       |
| 12                                                                                          |                   | 0.168 | 0.168 | 0.168 | 0.233 | 0.318 | 0.422 | 0.548 | 0.554 | 0.658 | 0.816 | 1.002 | 1.220 | 1.475 |       |       |
| 13                                                                                          |                   | 0.168 | 0.168 | 0.168 | 0.210 | 0.287 | 0.380 | 0.493 | 0.588 | 0.589 | 0.729 | 0.892 | 1.081 | 1.301 |       |       |
| 14                                                                                          |                   |       | 0.168 | 0.168 | 0.192 | 0.261 | 0.346 | 0.448 | 0.569 | 0.623 | 0.659 | 0.805 | 0.973 | 1.167 | 1.390 |       |
| 15                                                                                          |                   |       |       | 0.168 | 0.176 | 0.240 | 0.317 | 0.411 | 0.521 | 0.652 | 0.658 | 0.734 | 0.886 | 1.059 | 1.258 |       |
| 16                                                                                          |                   |       |       |       | 0.168 | 0.222 | 0.293 | 0.379 | 0.481 | 0.601 | 0.693 | 0.693 | 0.813 | 0.971 | 1.151 |       |
| 17                                                                                          |                   |       |       |       | 0.168 | 0.206 | 0.273 | 0.352 | 0.447 | 0.557 | 0.686 | 0.729 | 0.752 | 0.897 | 1.061 | 1.247 |
| 18                                                                                          |                   |       |       |       |       |       | 0.255 | 0.329 | 0.417 | 0.520 | 0.639 | 0.764 | 0.764 | 0.834 | 0.985 | 1.156 |
| 19                                                                                          |                   |       |       |       |       |       |       | 0.309 | 0.391 | 0.487 | 0.599 | 0.727 | 0.800 | 0.800 | 0.920 | 1.078 |
| 20                                                                                          |                   |       |       |       |       |       |       | 0.291 | 0.368 | 0.459 | 0.563 | 0.684 | 0.821 | 0.836 | 0.863 | 1.011 |
| 21                                                                                          |                   |       |       |       |       |       |       |       | 0.348 | 0.433 | 0.532 | 0.645 | 0.774 | 0.871 | 0.871 | 0.952 |
| 22                                                                                          |                   |       |       |       |       |       |       |       | 0.411 | 0.504 | 0.611 | 0.733 | 0.870 | 0.907 | 0.907 | 0.970 |
| 23                                                                                          |                   |       |       |       |       |       |       |       |       |       | 0.479 | 0.580 | 0.696 | 0.826 | 0.943 | 0.943 |
| 24                                                                                          |                   |       |       |       |       |       |       |       |       |       | 0.456 | 0.552 | 0.662 | 0.786 | 0.925 | 0.979 |
| 25                                                                                          |                   |       |       |       |       |       |       |       |       |       |       | 0.527 | 0.632 | 0.750 | 0.882 | 1.015 |
| 26                                                                                          |                   |       |       |       |       |       |       |       |       |       |       |       | 0.604 | 0.717 | 0.843 | 0.984 |
| 27                                                                                          |                   |       |       |       |       |       |       |       |       |       |       |       |       | 0.686 | 0.807 | 0.942 |

| AREA OF STEEL REQUIRED FOR J5 BARS IN WINGS (SQ. IN./FT.)<br>WALL HEIGHT VS. WALL THICKNESS |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---------------------------------------------------------------------------------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ⓢ Backfill Slope = 3:1                                                                      |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Wall Thickness<br>TX (in.)                                                                  | Wall Height (ft.) |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                                                                             | 5                 | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    |
| 8                                                                                           | 0.168             | 0.168 | 0.168 | 0.187 | 0.264 | 0.362 | 0.425 | 0.475 | 0.612 |       |       |       |       |       |       |       |
| 9                                                                                           | 0.168             | 0.168 | 0.168 | 0.168 | 0.222 | 0.303 | 0.403 | 0.456 | 0.504 | 0.637 | 0.795 |       |       |       |       |       |
| 10                                                                                          | 0.168             | 0.168 | 0.168 | 0.168 | 0.191 | 0.261 | 0.346 | 0.450 | 0.487 | 0.541 | 0.671 | 0.824 | 1.005 | 1.217 |       |       |
| 11                                                                                          | 0.168             | 0.168 | 0.168 | 0.168 | 0.168 | 0.229 | 0.304 | 0.394 | 0.501 | 0.520 | 0.583 | 0.713 | 0.864 | 1.039 |       |       |
| 12                                                                                          |                   | 0.168 | 0.168 | 0.168 | 0.168 | 0.204 | 0.271 | 0.351 | 0.445 | 0.554 | 0.554 | 0.629 | 0.760 | 0.910 |       |       |
| 13                                                                                          |                   | 0.168 | 0.168 | 0.168 | 0.168 | 0.185 | 0.244 | 0.316 | 0.401 | 0.501 | 0.588 | 0.588 | 0.679 | 0.812 | 0.963 |       |
| 14                                                                                          |                   |       | 0.168 | 0.168 | 0.168 | 0.168 | 0.223 | 0.288 | 0.365 | 0.455 | 0.560 | 0.623 | 0.623 | 0.733 | 0.868 |       |
| 15                                                                                          |                   |       |       | 0.168 | 0.168 | 0.168 | 0.204 | 0.264 | 0.335 | 0.417 | 0.513 | 0.623 | 0.658 | 0.669 | 0.791 |       |
| 16                                                                                          |                   |       |       |       | 0.168 | 0.168 | 0.189 | 0.244 | 0.309 | 0.385 | 0.474 | 0.575 | 0.690 | 0.693 | 0.727 |       |
| 17                                                                                          |                   |       |       |       | 0.168 | 0.168 | 0.176 | 0.227 | 0.287 | 0.358 | 0.440 | 0.533 | 0.640 | 0.729 | 0.729 | 0.788 |
| 18                                                                                          |                   |       |       |       |       |       | 0.168 | 0.212 | 0.269 | 0.334 | 0.411 | 0.498 | 0.597 | 0.709 | 0.764 | 0.764 |
| 19                                                                                          |                   |       |       |       |       |       |       | 0.199 | 0.252 | 0.314 | 0.385 | 0.467 | 0.559 | 0.664 | 0.782 | 0.800 |
| 20                                                                                          |                   |       |       |       |       |       |       | 0.188 | 0.237 | 0.295 | 0.362 | 0.439 | 0.526 | 0.625 | 0.735 | 0.836 |
| 21                                                                                          |                   |       |       |       |       |       |       |       | 0.224 | 0.279 | 0.342 | 0.415 | 0.497 | 0.590 | 0.694 | 0.810 |
| 22                                                                                          |                   |       |       |       |       |       |       |       |       | 0.265 | 0.325 | 0.393 | 0.471 | 0.558 | 0.657 | 0.766 |
| 23                                                                                          |                   |       |       |       |       |       |       |       |       |       | 0.308 | 0.373 | 0.447 | 0.530 | 0.624 | 0.727 |
| 24                                                                                          |                   |       |       |       |       |       |       |       |       |       | 0.294 | 0.356 | 0.426 | 0.505 | 0.594 | 0.692 |
| 25                                                                                          |                   |       |       |       |       |       |       |       |       |       |       | 0.340 | 0.407 | 0.482 | 0.566 | 0.661 |
| 26                                                                                          |                   |       |       |       |       |       |       |       |       |       |       |       | 0.389 | 0.461 | 0.542 | 0.632 |
| 27                                                                                          |                   |       |       |       |       |       |       |       |       |       |       |       |       | 0.442 | 0.519 | 0.605 |

NOTE:

THE WALL HEIGHT IS EQUAL TO THE BARREL HEIGHT (HT) PLUS THE TOP SLAB THICKNESS (TS). WHEN WALL HEIGHT IS IN BETWEEN OR OUTSIDE TABULATED WALL HEIGHTS, THE AREA OF STEEL REQUIRED SHOULD BE INTERPOLATED BETWEEN OR EXTRAPOLATED FROM ADJACENT AREAS OF STEEL USING THE ACTUAL WALL HEIGHT.

IF AREA OF STEEL IN THE WALL OF THE CULVERT (J4 BARS) IS GREATER THAN THAT INDICATED IN THE TABLE, USE THE SAME SIZE AND SPACING FOR THE J5 BARS IN THE WINGS. HOWEVER, IF THE AREA OF STEEL PROVIDED BY MATCHING SIZE AND SPACING OF THE J4 BARS IS INSUFFICIENT, INCREASE THE SIZE OF THE J5 BARS (#8 MAX.) AND/OR DECREASE THE SPACING OF THE J5 BARS (6" MIN.). USE SMALLEST BAR SIZE POSSIBLE BASED ON MINIMUM SPACING.

MINIMUM STEEL TO BE USED IN THE WINGS FOR J5 BARS IS #4 BARS AT 14" CENTERS (AREA OF STEEL = 0.1683 SQ. IN./FT.)

Ⓢ SEE STANDARD PLAN 703.37C, SHEET 2 OF 2 FOR BACKFILL SLOPE TO BE USED BASED ON SKEW.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

DENNIS W. HECKMAN

NUMBER PE-27141

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

DATE EFFECTIVE: 04/01/2011

DATE PREPARED: 4/18/2011

703.37C

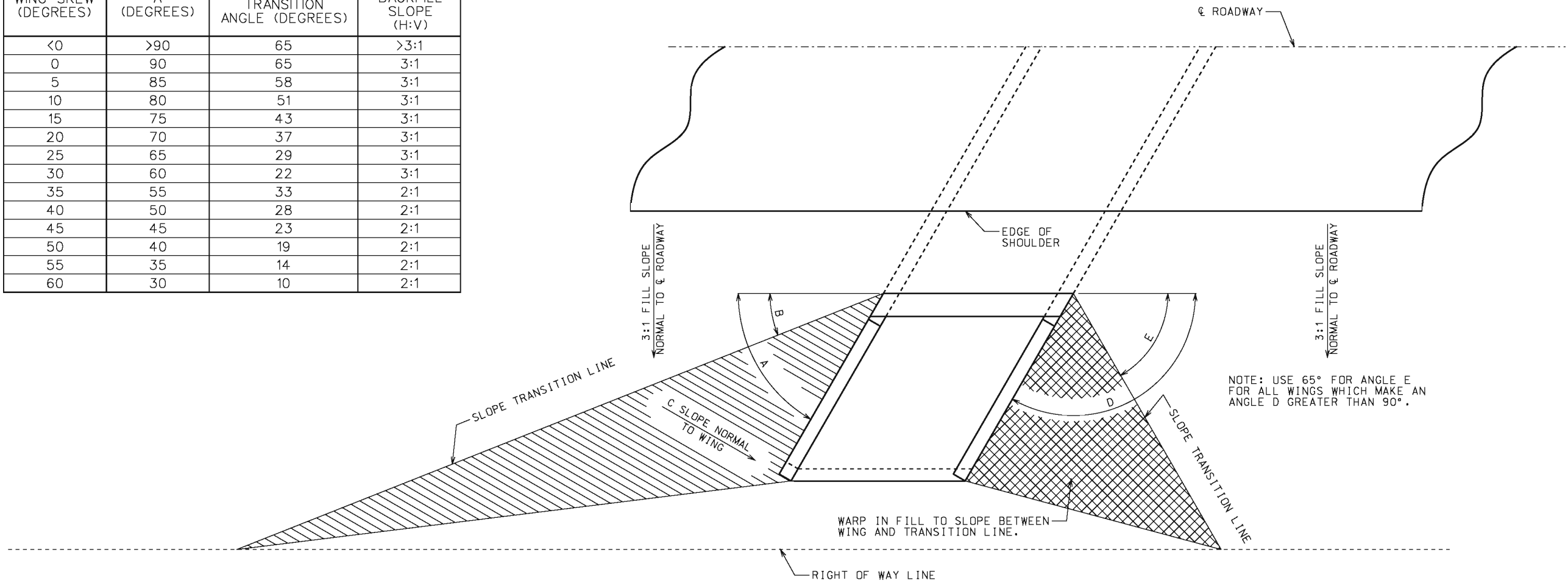
SHEET NO.

1 OF 2

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| WING BACKFILL TABLE    |                |                                    |                                 |
|------------------------|----------------|------------------------------------|---------------------------------|
| WING SKEW<br>(DEGREES) | A<br>(DEGREES) | B<br>TRANSITION<br>ANGLE (DEGREES) | C<br>BACKFILL<br>SLOPE<br>(H:V) |
| <0                     | >90            | 65                                 | >3:1                            |
| 0                      | 90             | 65                                 | 3:1                             |
| 5                      | 85             | 58                                 | 3:1                             |
| 10                     | 80             | 51                                 | 3:1                             |
| 15                     | 75             | 43                                 | 3:1                             |
| 20                     | 70             | 37                                 | 3:1                             |
| 25                     | 65             | 29                                 | 3:1                             |
| 30                     | 60             | 22                                 | 3:1                             |
| 35                     | 55             | 33                                 | 2:1                             |
| 40                     | 50             | 28                                 | 2:1                             |
| 45                     | 45             | 23                                 | 2:1                             |
| 50                     | 40             | 19                                 | 2:1                             |
| 55                     | 35             | 14                                 | 2:1                             |
| 60                     | 30             | 10                                 | 2:1                             |



PLAN OF WINGS AND SLOPE TRANSITION LINES

NOTE: BACKFILL TRANSITION ANGLE AND BACKFILL SLOPE SHALL APPLY TO ALL BOX CULVERTS REGARDLESS OF TYPE - SINGLE, DOUBLE, OR TRIPLE.



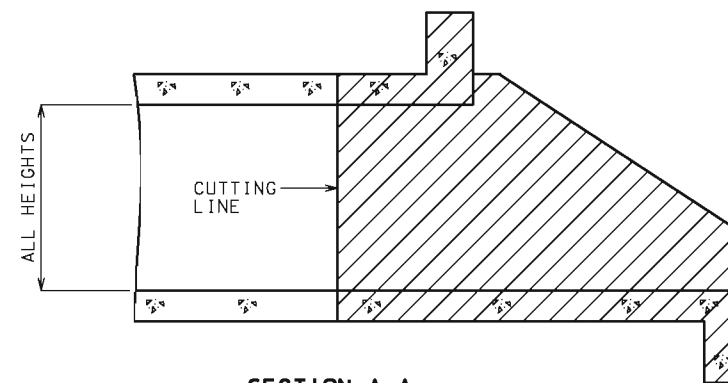
**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**CONCRETE BOX CULVERT**  
EXTERIOR WING BACKFILL  
SLOPE TRANSITION

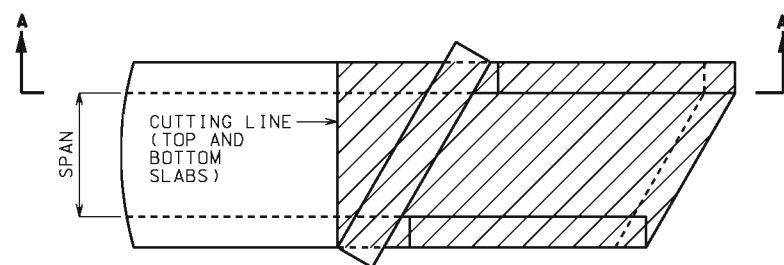
STATE OF MISSOURI  
DENNIS W. HECKMAN  
NUMBER PE-27141  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

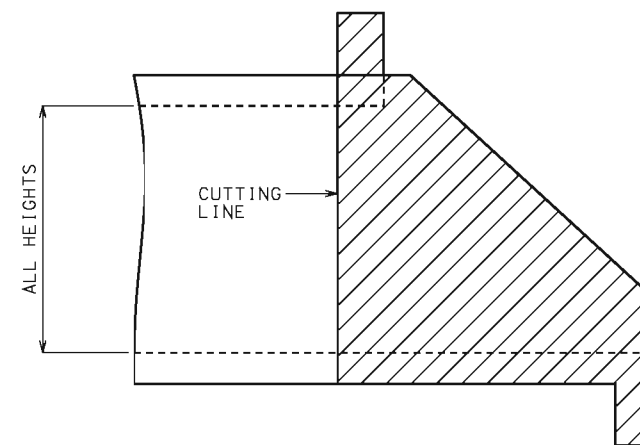
|                 |            |                |                            |
|-----------------|------------|----------------|----------------------------|
| DATE EFFECTIVE: | 04/01/2011 | <b>703.37C</b> | SHEET NO.<br><b>2 OF 2</b> |
| DATE PREPARED:  | 4/18/2011  |                |                            |



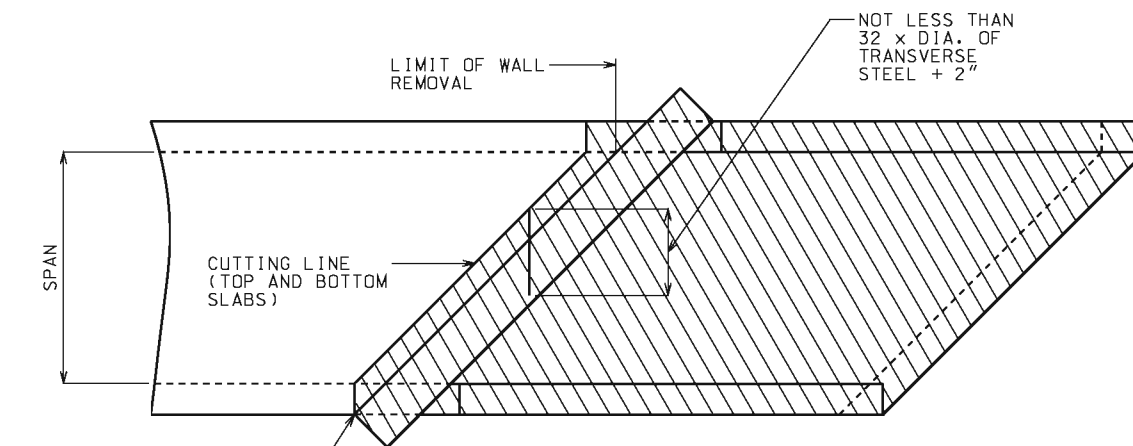
SECTION A-A



PLAN

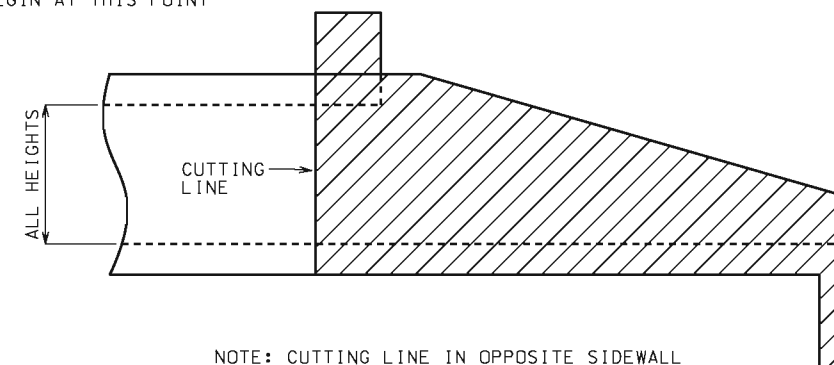


SIDE ELEVATION  
NO SKEW OR SKEWS LESS THAN 20°



PLAN

CUT IN TOP AND BOTTOM  
SLABS ALWAYS TO  
BEGIN AT THIS POINT



NOTE: CUTTING LINE IN OPPOSITE SIDEWALL  
IS TO MEET CUT IN BOTTOM SLAB.

SIDE ELEVATION  
SKEW OF 20° OR MORE

#### GENERAL NOTES:

THE HATCHED PARTS OF THESE DRAWINGS INDICATE THOSE PORTIONS OF THE EXISTING CULVERT WHICH ARE TO BE REMOVED.

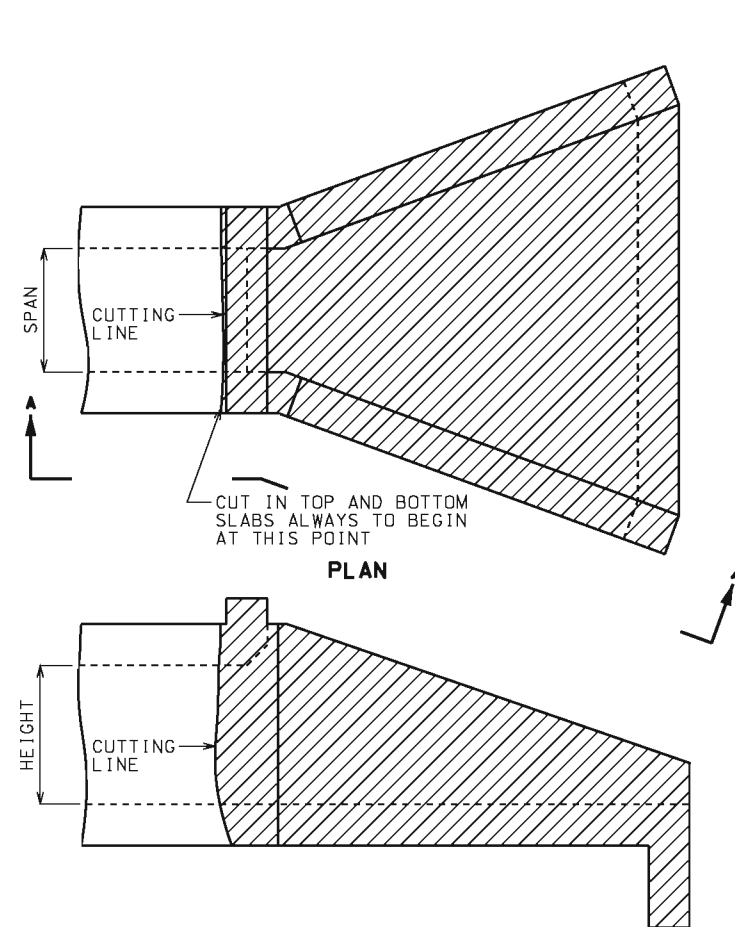
ALL REINFORCING BARS WITHIN AREAS SHOWN TO BE REMOVED, THAT ARE BONDED IN UNDISTURBED OLD CONCRETE, SHALL BE CLEANLY STRIPPED, STRAIGHTENED, AND EXTENDED INTO NEW CONCRETE.

SEE STANDARD SPECIFICATIONS FOR REQUIRED BUSHHAMMERING AND TREATING OF OLD CONCRETE SURFACES WHICH ARE TO RECEIVE NEW CONCRETE.

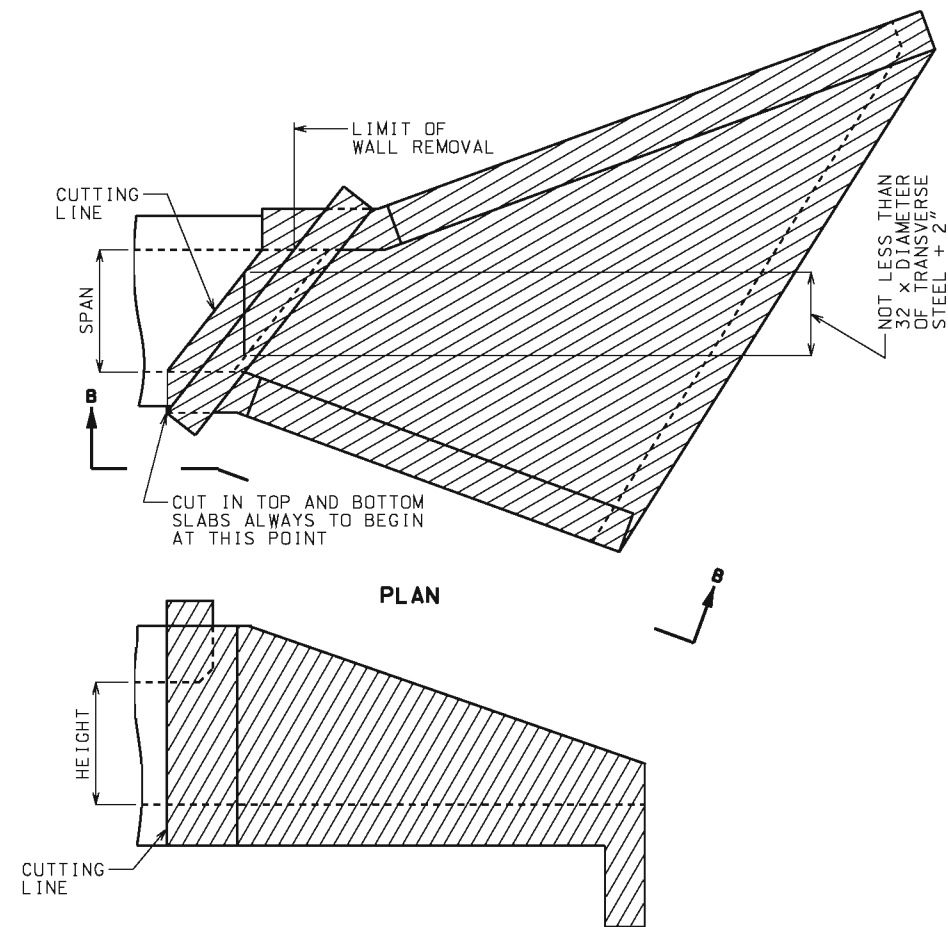
A CONTINUOUS V-GROOVE AT LEAST 1" IN DEPTH SHALL BE CUT ON THE FACE OF THE CONCRETE AS A GUIDE FOR THE LINE OF BREAK AND TO PREVENT SPALLING.

THE BOX EXTENSION OPENING SHALL BE BUILT TO MATCH THE EXISTING BOX OPENING. WHEN THE EXISTING OPENING DOES NOT MATCH A SIZE FROM THE TABLES, THE NEXT LARGER SIZE SHALL BE USED FOR DETERMINING THE MEMBER SIZES AND REINFORCEMENT.

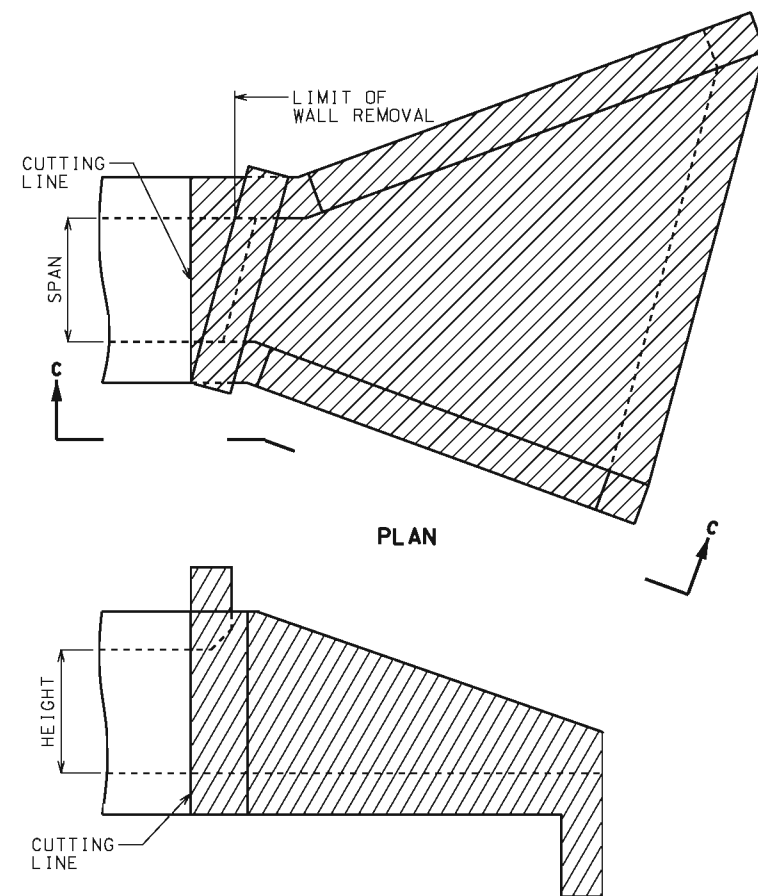
|                                                                                                                                                                                                                                  |                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                |
|                                                                                                                                             | <b>CONCRETE BOX CULVERTS</b><br>CUTTING DETAILS<br>EXTENSION TO STRAIGHT WINGS |
| DATE EFFECTIVE: 10-01-2009<br>DATE PREPARED: 8/18/2009                                                                                                                                                                           | <b>703.38A</b>                                                                 |
| SHEET NO.<br><b>1 OF 2</b>                                                                                                                                                                                                       |                                                                                |



**ELEVATION A-A**  
NO SKEW



**ELEVATION B-B**  
SKEWS OF 20° OR MORE



**ELEVATION C-C**  
SKEWS LESS THAN 20°

**GENERAL NOTES:**

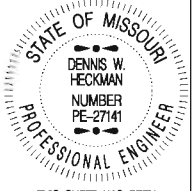
THE HATCHED PARTS OF THESE DRAWINGS INDICATE THOSE PORTIONS OF THE EXISTING CULVERT WHICH ARE TO BE REMOVED.

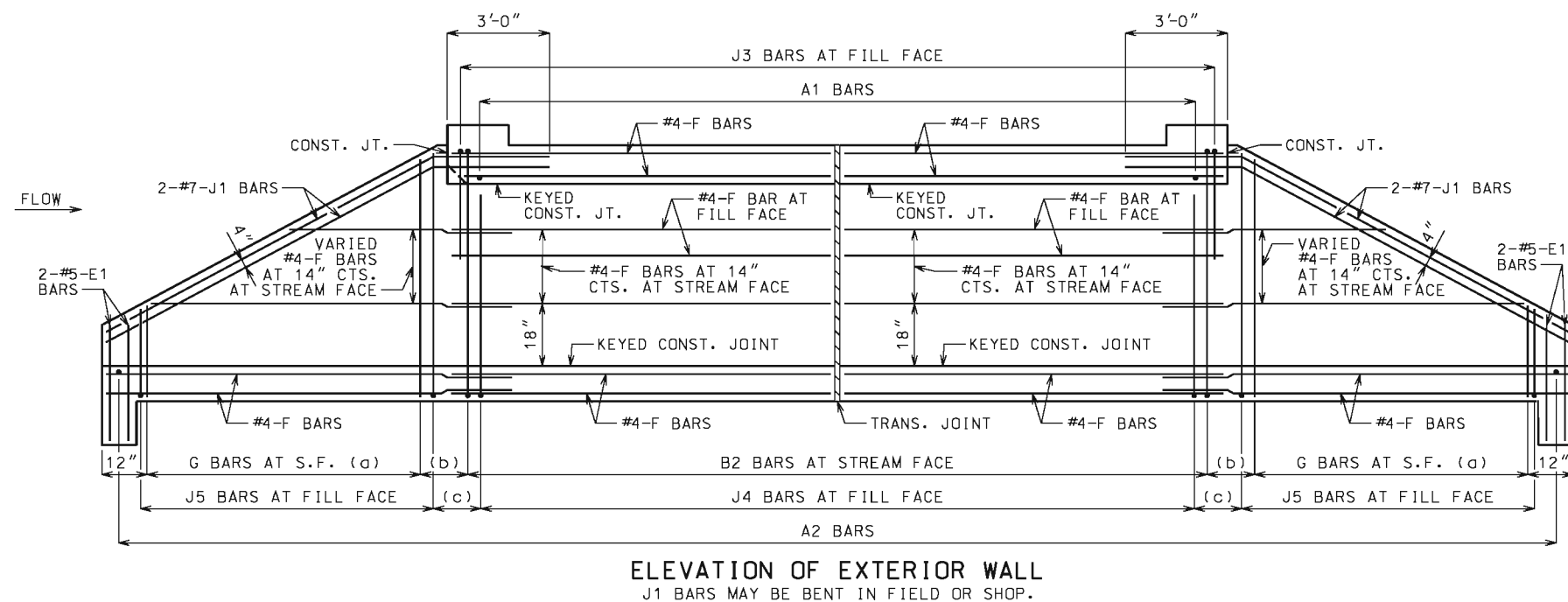
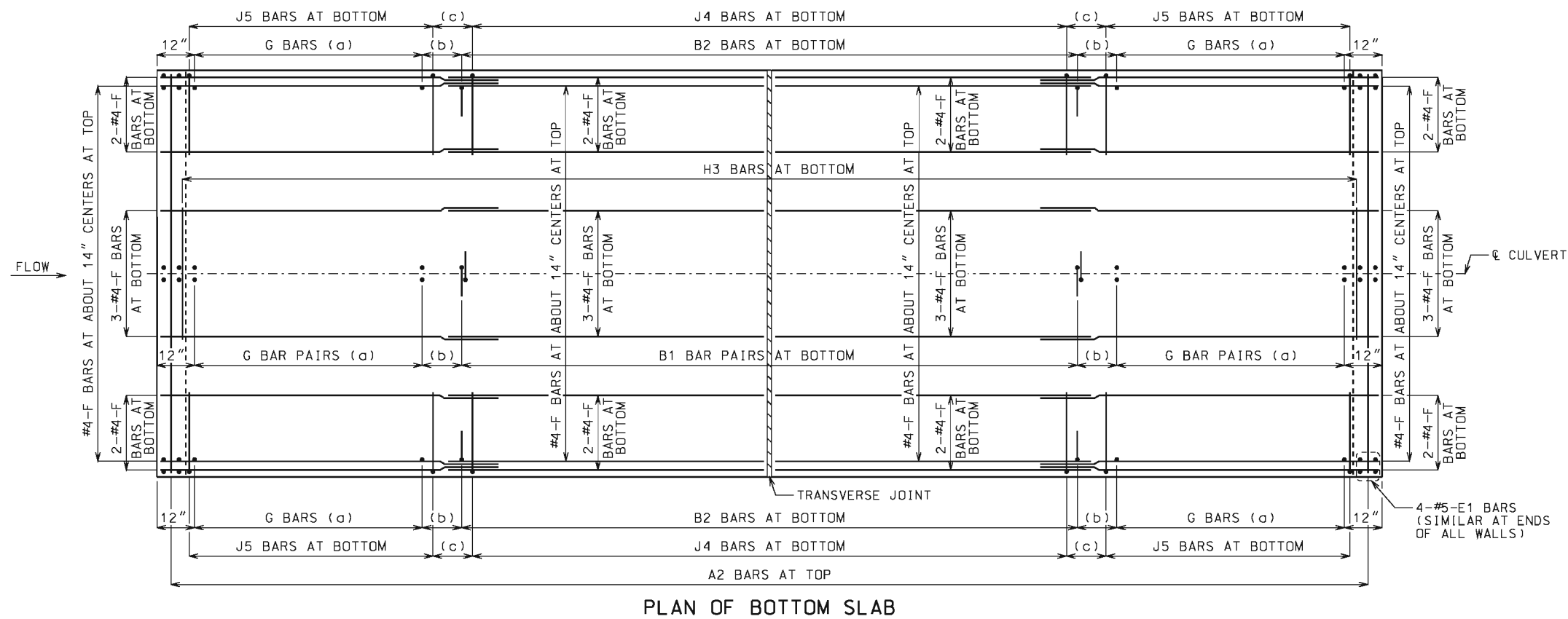
ALL REINFORCING BARS WITHIN AREAS SHOWN TO BE REMOVED, THAT ARE BONDED IN UNDISTURBED OLD CONCRETE, SHALL BE CLEANLY STRIPPED, STRAIGHTENED, AND EXTENDED INTO NEW CONCRETE.

SEE STANDARD SPECIFICATIONS FOR REQUIRED BUSHHAMMERING AND TREATING OF OLD CONCRETE SURFACES WHICH ARE TO RECEIVE NEW CONCRETE.

A CONTINUOUS V-GROOVE AT LEAST 1" IN DEPTH SHALL BE CUT ON THE FACE OF THE CONCRETE AS A GUIDE FOR THE LINE OF BREAK AND TO PREVENT SPALLING.

THE BOX EXTENSION OPENING SHALL BE BUILT TO MATCH THE EXISTING BOX OPENING. WHEN THE EXISTING OPENING DOES NOT MATCH A SIZE FROM THE TABLES, THE NEXT LARGER SIZE SHALL BE USED FOR DETERMINING THE MEMBER SIZES AND REINFORCEMENT.

|                                                                                                                                                                                                                                  |                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                              |
|                                                                                                                                             | <b>CONCRETE BOX CULVERTS</b><br>CUTTING DETAILS<br>EXTENSION TO FLARED WINGS |
| DATE EFFECTIVE: 10-01-2009<br>DATE PREPARED: 8/18/2009                                                                                                                                                                           | <b>703.38A</b>                                                               |
| SHEET NO.<br><b>2 OF 2</b>                                                                                                                                                                                                       |                                                                              |



## LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.46.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

|                                                                                                                                                                                                                                  |                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                                    |
|                                                                                                                                             | <b>CONCRETE<br/>DOUBLE BOX CULVERT</b><br><br><b>SKEW: SQUARED<br/>WINGS: STRAIGHT</b><br><br><b>REINFORCEMENT</b> |
| DATE EFFECTIVE: 10/01/2011<br>DATE PREPARED: 5/13/2015                                                                                                                                                                           | <b>703.40H</b>                                                                                                     |
| SHEET NO.<br>1 OF 3                                                                                                                                                                                                              |                                                                                                                    |





FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



IF D2 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF  $\phi$  WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



GENERAL NOTES:

FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW  
DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".



UNLESS SHOWN ON BRIDGE PLANS

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE  
SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE  
JOINT.

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.46.



J1 AND J6 BARS MAY BE BENT IN FIELD OR SHOP.

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2 ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

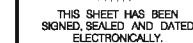
(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING



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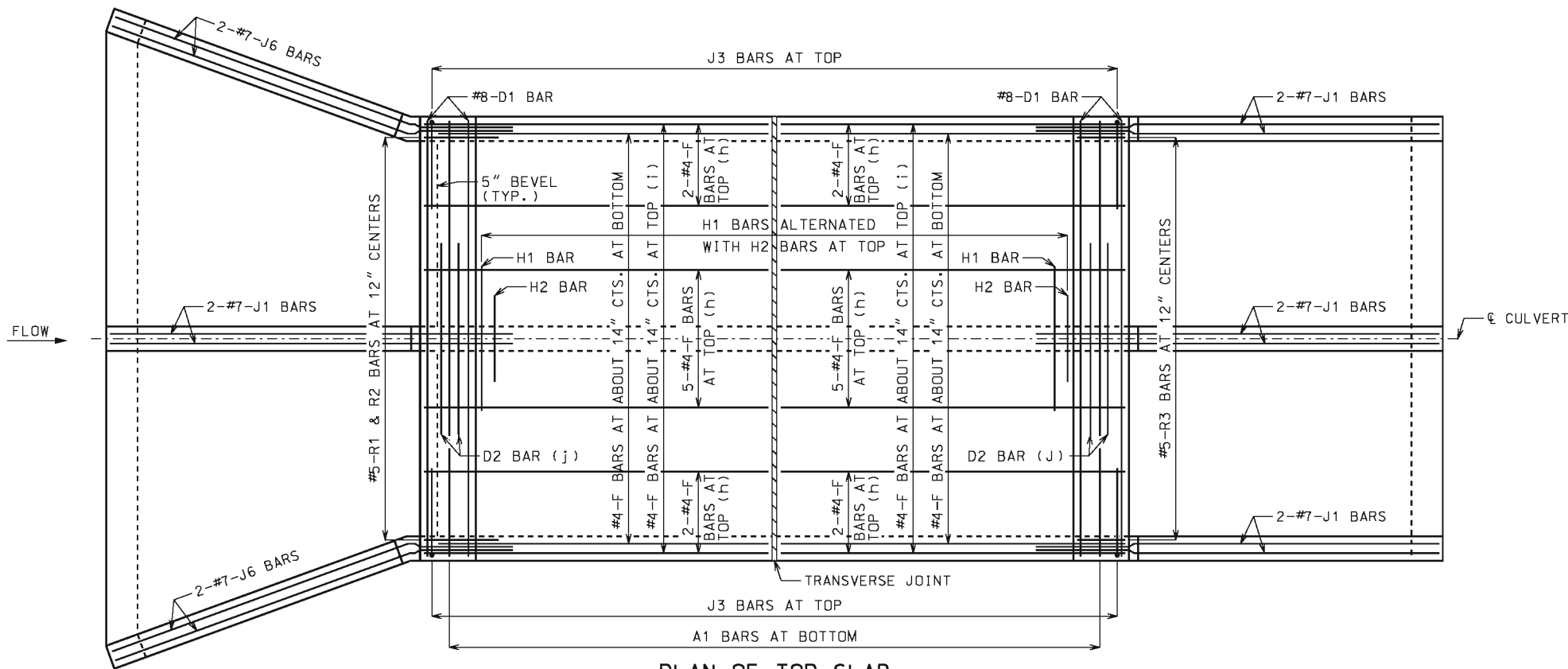
SKEW: SQUARED  
WINGS: FLARED

DATE EFFECTIVE: 10/01/2011  
DATE PREPARED: 5/13/2015

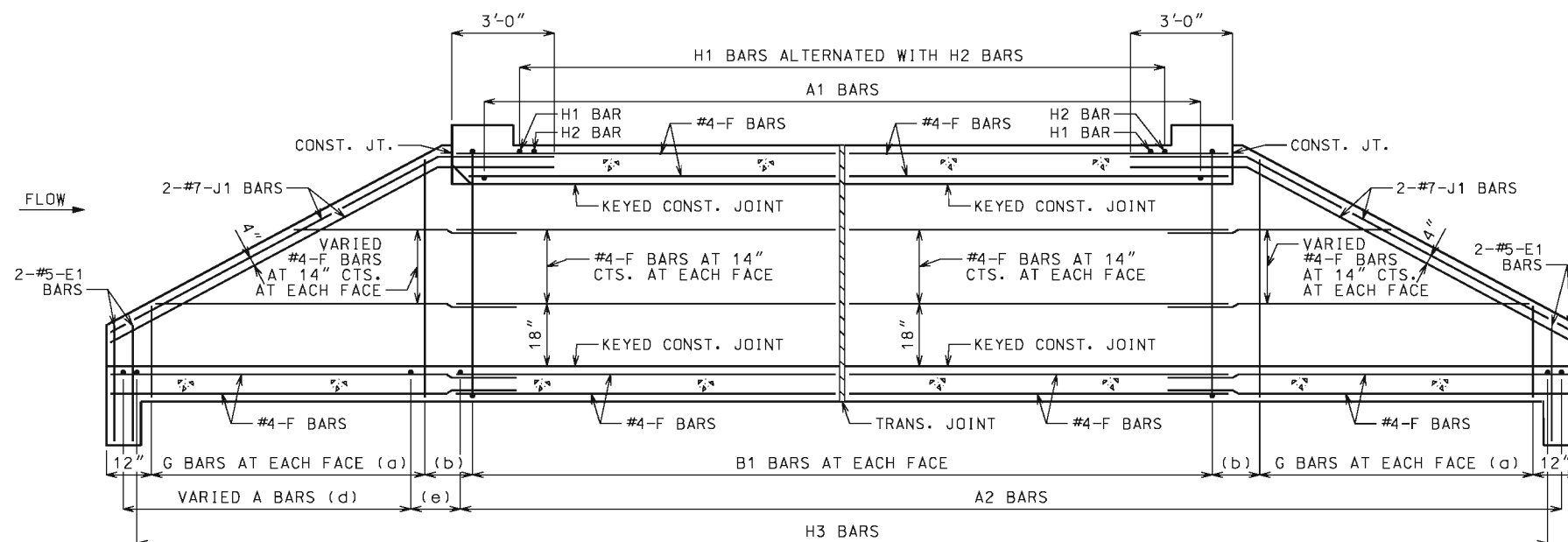
**703.41H**

SHEET NO.  
1 OF 3





**PLAN OF TOP SLAB**  
B BARS IN WALLS ARE NOT SHOWN FOR CLARITY.  
FOR PLACEMENT, SEE SHEET 1 OF 3.



**SECTION NEAR INTERIOR WALL**  
J1 BARS MAY BE BENT IN FIELD OR SHOP.

### GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) NOT SPECIFIED ON THIS SHEET

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

(f) NOT SPECIFIED ON THIS SHEET

(g) NOT SPECIFIED ON THIS SHEET

(h) FOR DESIGN FILLS OVER 2'-0"

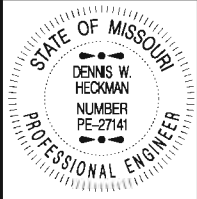
(i) FOR DESIGN FILLS 2'-0" OR LESS

(j) NOT REQUIRED FOR CLEAR SPANS  $\leq 10'-0"$

#8 FOR CLEAR SPAN  $> 10'-0"$

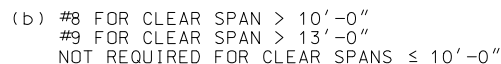
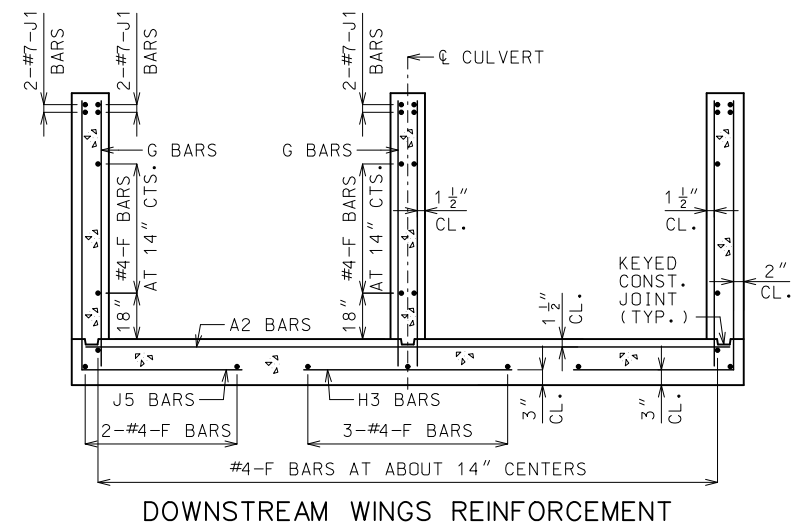
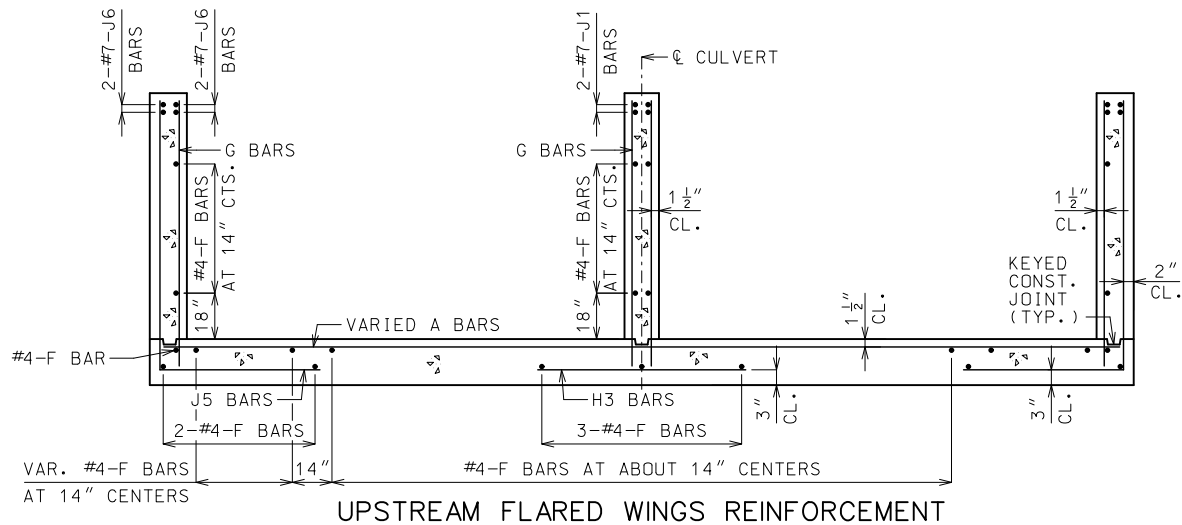
#9 FOR CLEAR SPAN  $> 13'-0"$

IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

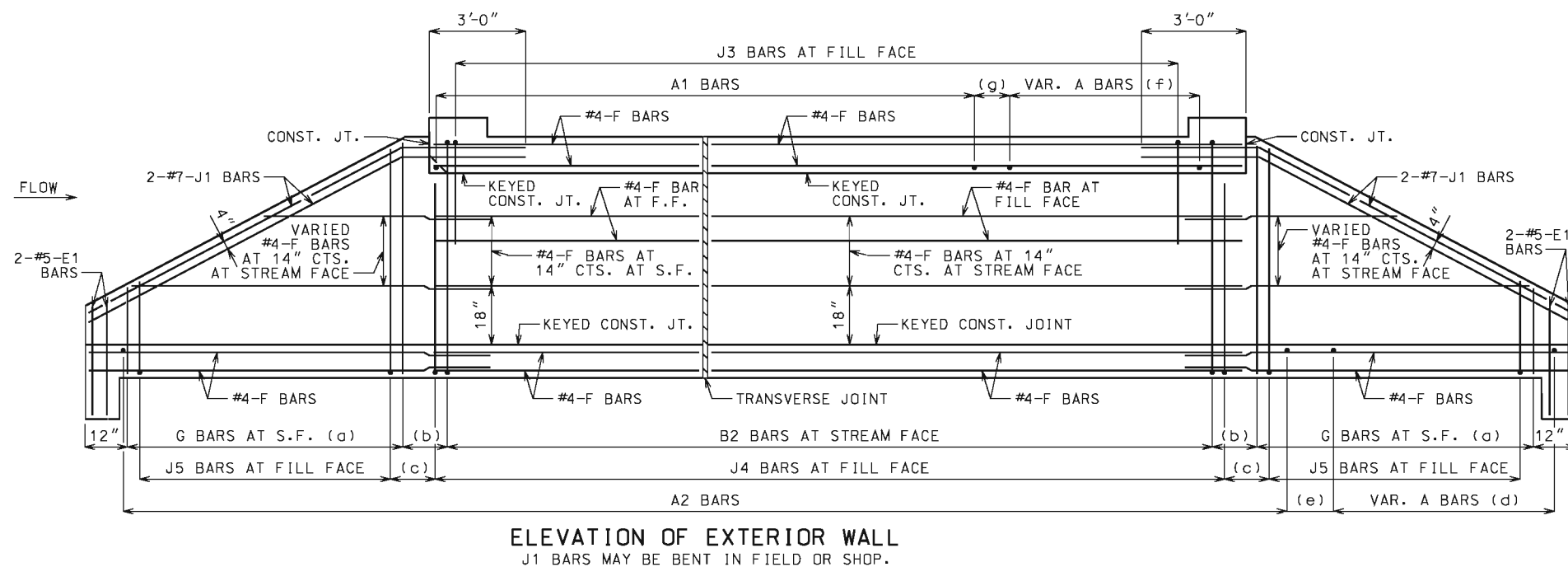
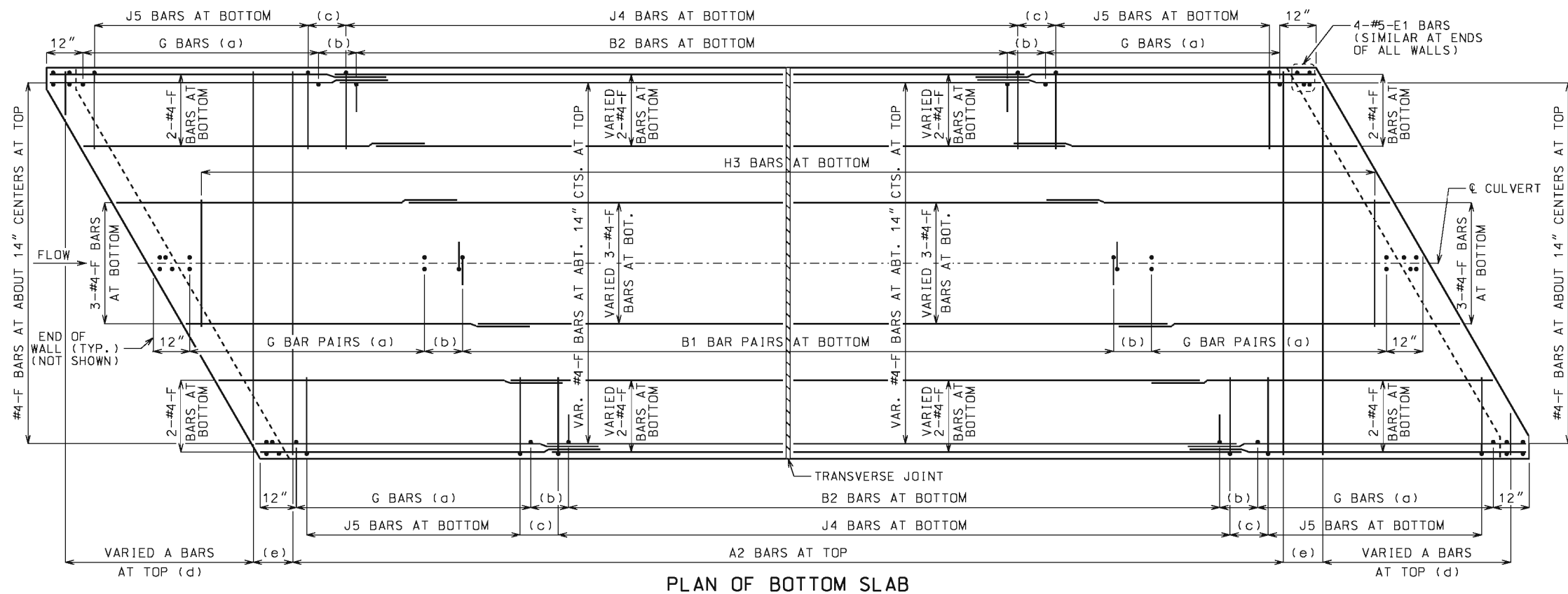
|                                                                                                                                                                                                                                  |                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                          |
|                                                                                                                                             | <b>CONCRETE<br/>DOUBLE BOX CULVERT</b><br><br>SKEW: SQUARED<br>WINGS: FLARED<br><br><b>REINFORCEMENT</b> |
| DATE EFFECTIVE: <u>10/01/2011</u><br>DATE PREPARED: <u>5/13/2015</u>                                                                                                                                                             | <b>703.41H</b>                                                                                           |
| SHEET NO.<br><b>2 OF 3</b>                                                                                                                                                                                                       |                                                                                                          |



FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED:



## LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.46.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

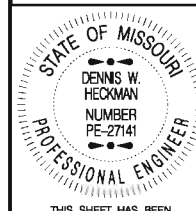
(c) J4 BAR SPACING

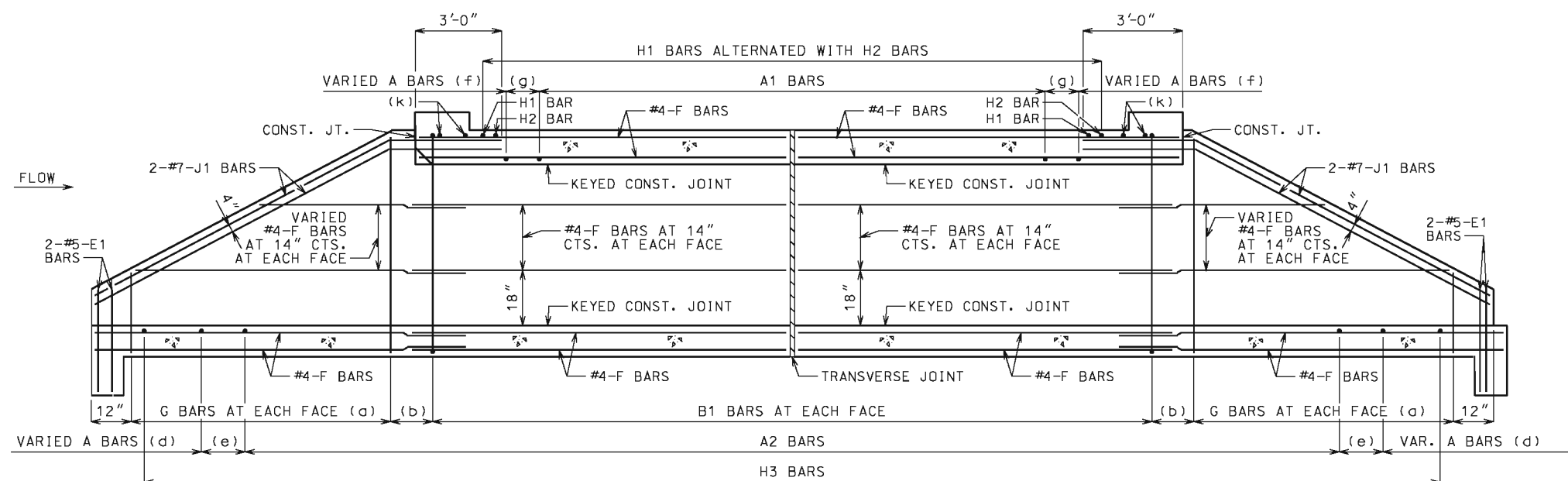
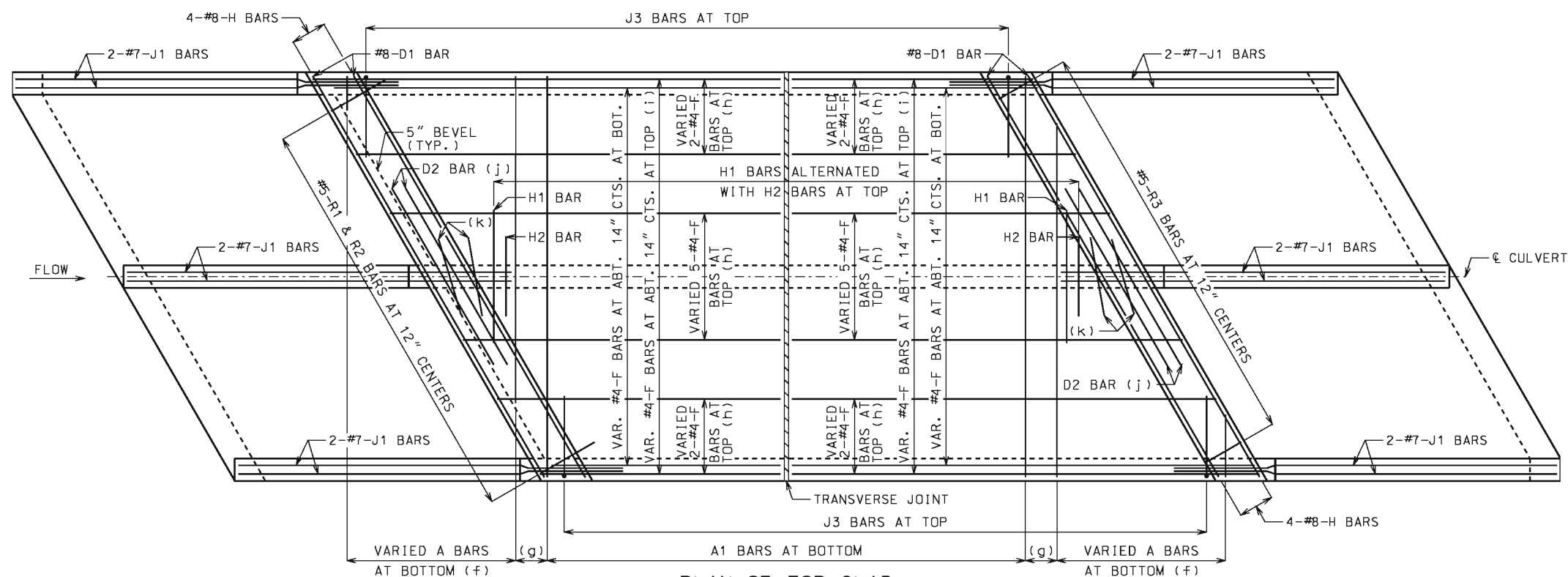
(d) SAME SIZE AND SPACING AS A2 BARS

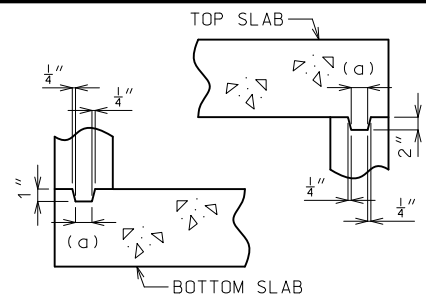
(e) A2 BAR SPACING

(f) SAME SIZE AND SPACING AS A1 BARS

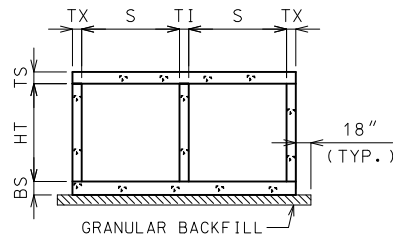
(g) A1 BAR SPACING

|                                                                                                                                                                                                                                  |                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                                 |
|                                                                                                                                             | <b>CONCRETE<br/>DOUBLE BOX CULVERT</b><br><br>SKEW: LEFT ADVANCE<br>WINGS: STRAIGHT<br><br><b>REINFORCEMENT</b> |
| DATE EFFECTIVE: 10/01/2011<br>DATE PREPARED: 5/13/2015                                                                                                                                                                           | <b>703.42H</b>                                                                                                  |
| SHEET NO.<br>1 OF 3                                                                                                                                                                                                              |                                                                                                                 |

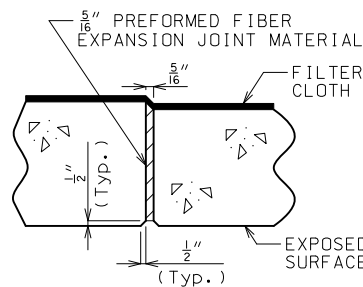




**KEYED CONSTRUCTION JOINT**  
(a) APPROXIMATELY ONE-THIRD OF WALL THICKNESS



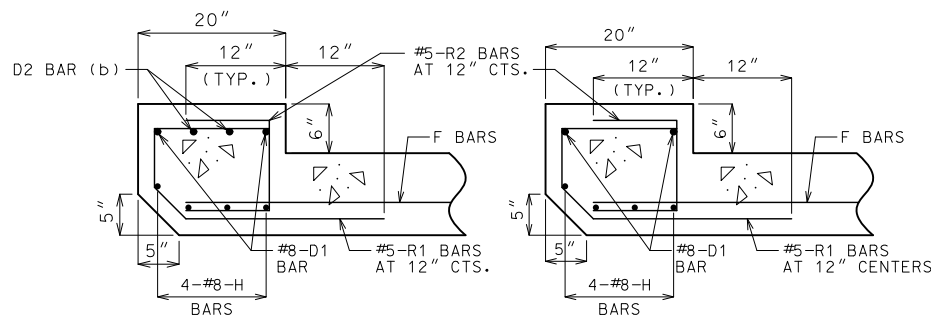
**GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS**



**TRANSVERSE JOINT THRU BARREL**

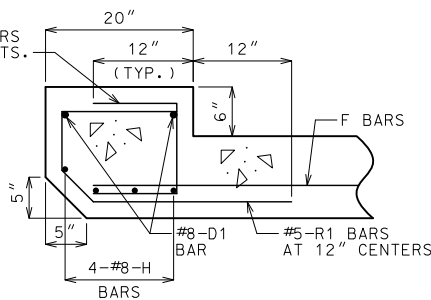
PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.

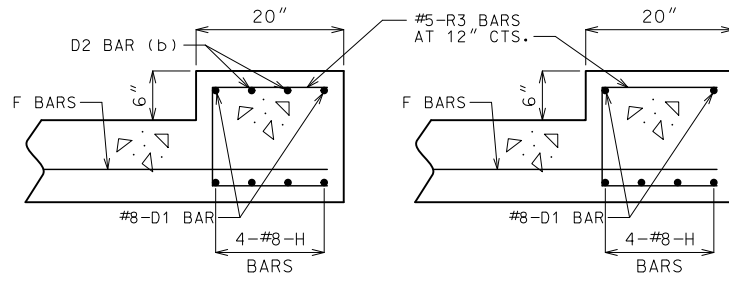


**UPSTREAM HEADWALL REINFORCEMENT**  
NEAR INTERIOR WALL

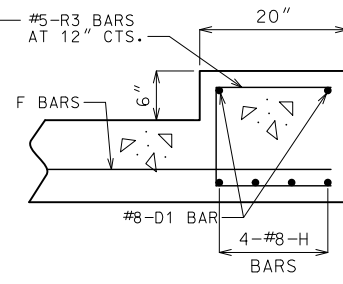
(b) #8 FOR CLEAR SPAN > 10'-0"  
#9 FOR CLEAR SPAN > 13'-0"  
NOT REQUIRED FOR CLEAR SPANS ≤ 10'-0"



**UPSTREAM HEADWALL REINFORCEMENT**  
NEAR MIDSPAN

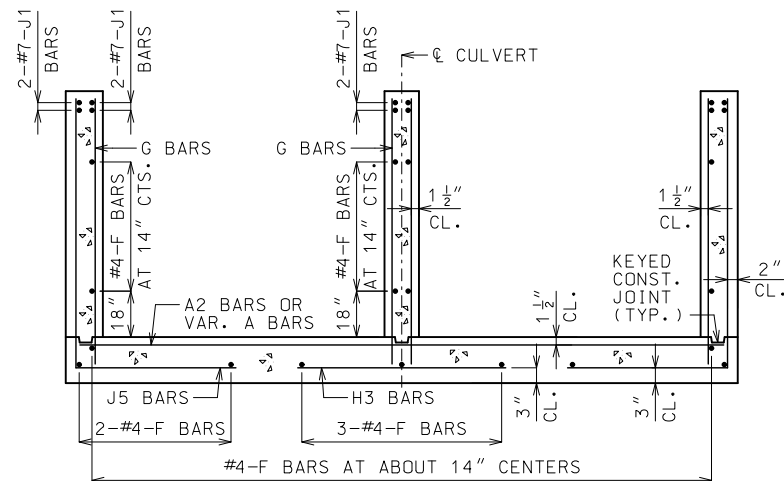


**DOWNSTREAM HEADWALL REINFORCEMENT**  
NEAR INTERIOR WALL

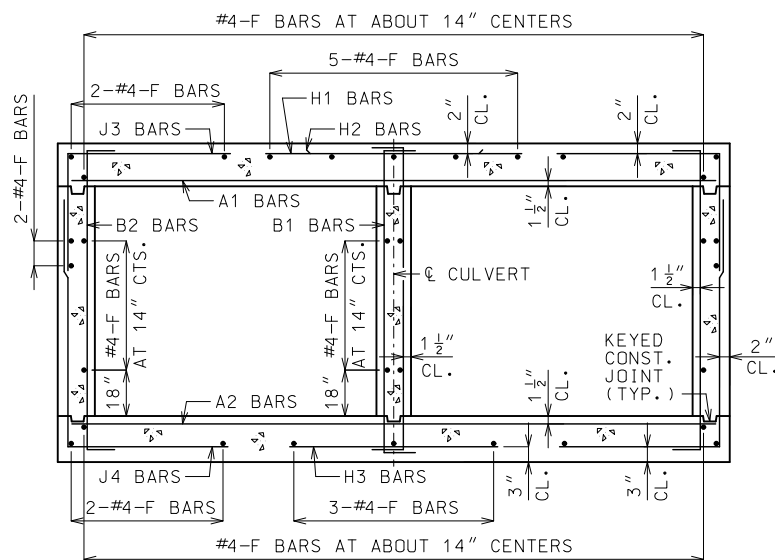


**DOWNSTREAM HEADWALL REINFORCEMENT**  
NEAR MIDSPAN

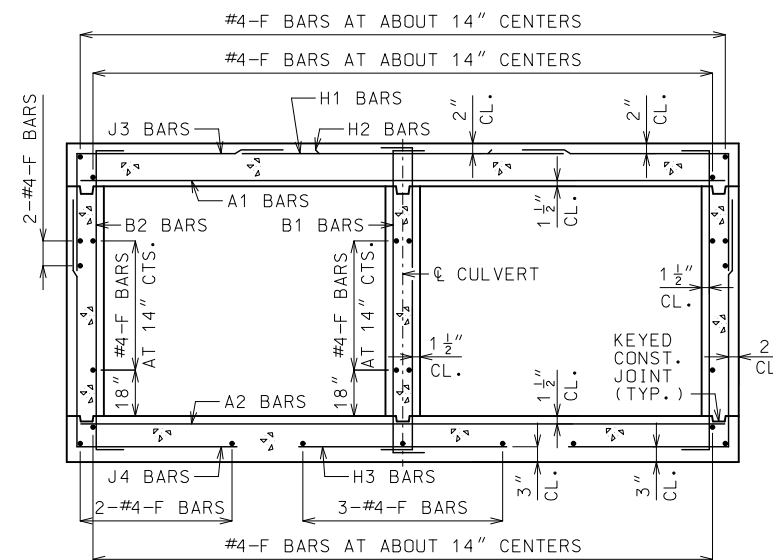
IF D2 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF  $\emptyset$  WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



**UPSTREAM AND DOWNSTREAM WINGS REINFORCEMENT**



**BARREL REINFORCEMENT**  
FOR DESIGN FILLS OVER 2'-0"



**BARREL REINFORCEMENT**  
FOR DESIGN FILLS 2'-0" OR LESS

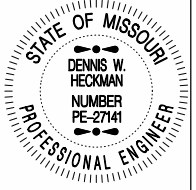
**GENERAL NOTES:**

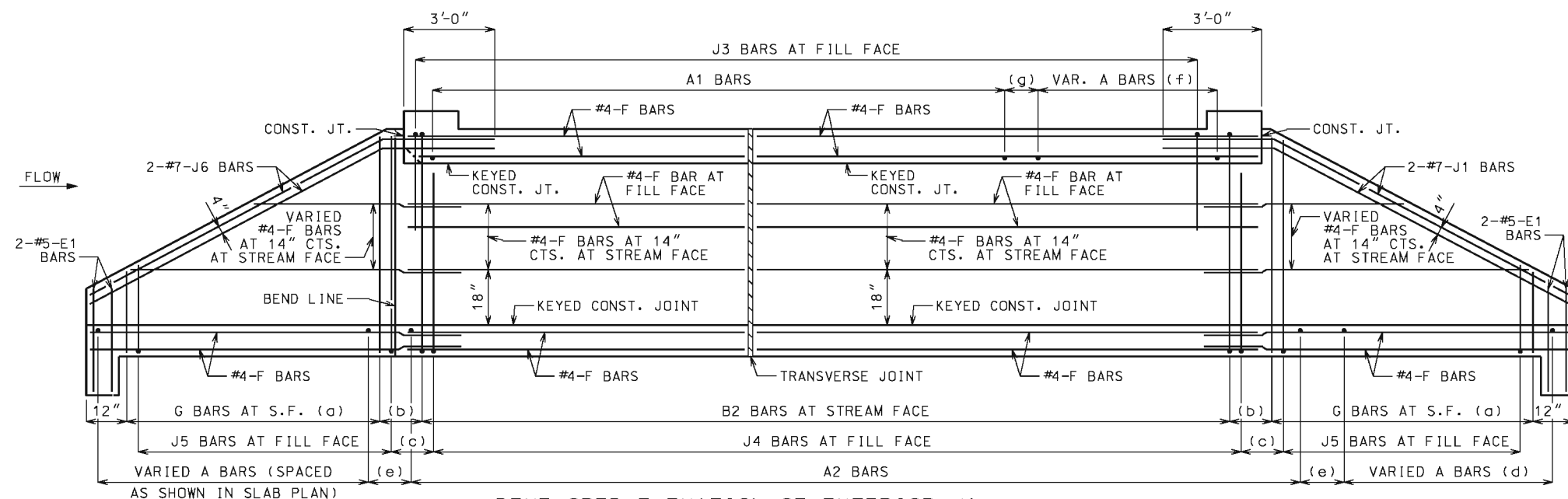
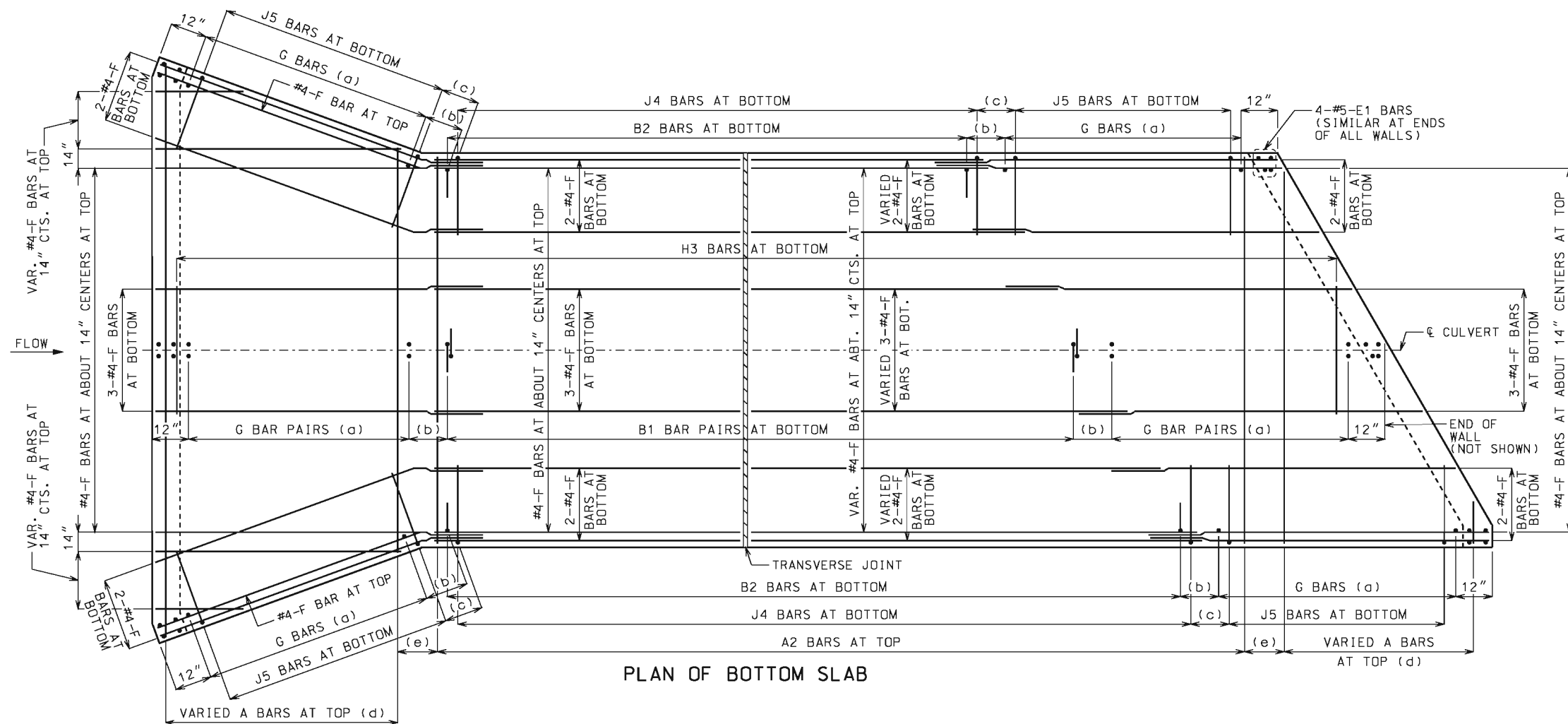
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO  $\emptyset$  CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2 inch.

|                                                                                                                                                                                 |                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                                    |                                                                                             |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                                                |                                                                                             |
|  <b>STATE OF MISSOURI</b><br>DENNIS W. HECKMAN<br>NUMBER PE-27141<br>PROFESSIONAL ENGINEER | <b>CONCRETE DOUBLE BOX CULVERT</b><br>SKEW: LEFT ADVANCE<br>WINGS: STRAIGHT<br><br>SECTIONS |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                         | <b>703.42H</b><br>SHEET NO. 3 OF 3                                                          |



J1 AND J6 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION. BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.46.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

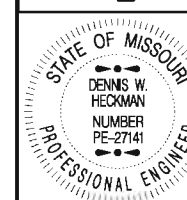
(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MDOT (1-888-275-6636)



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

SKEW: LEFT ADVANCE  
WINGS: FLARED

REINFORCEMENT

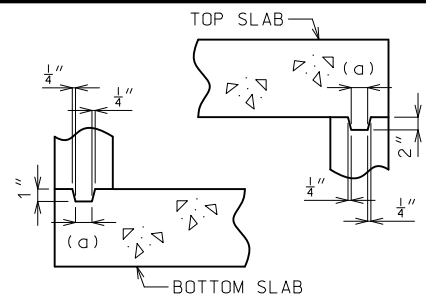
DATE EFFECTIVE: 10/01/2011  
DATE PREPARED: 5/13/2015

703.43H

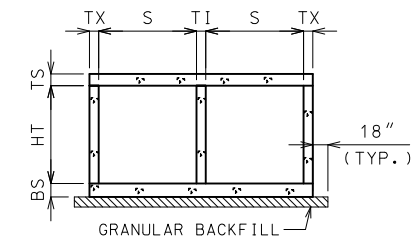
SHEET NO.  
1 OF 3



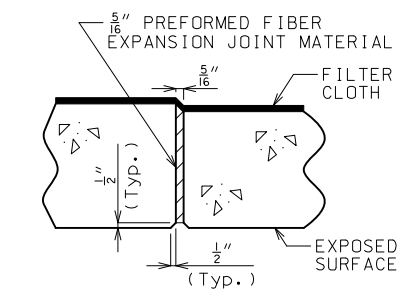




KEYED CONSTRUCTION JOINT  
(a) APPROXIMATELY ONE-THIRD OF WALL THICKNESS



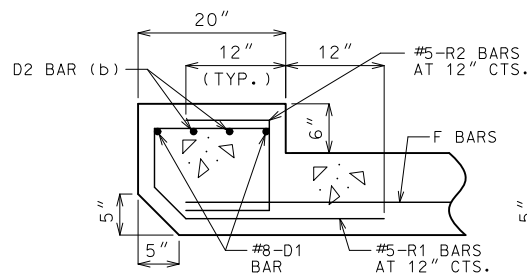
GRANULAR BACKFILL LIMITS  
AND MEMBER DIMENSIONS



TRANSVERSE JOINT THRU BARREL

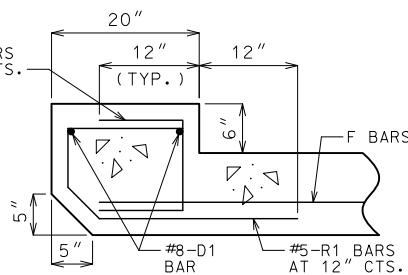
PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.

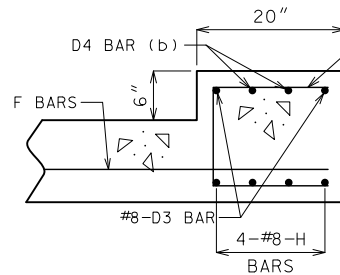


UPSTREAM HEADWALL  
REINFORCEMENT  
NEAR INTERIOR WALL

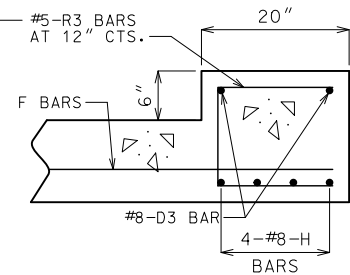
(b) #8 FOR CLEAR SPAN > 10'-0"  
#9 FOR CLEAR SPAN > 13'-0"  
NOT REQUIRED FOR CLEAR SPANS ≤ 10'-0"



UPSTREAM HEADWALL  
REINFORCEMENT  
NEAR MIDSPAN

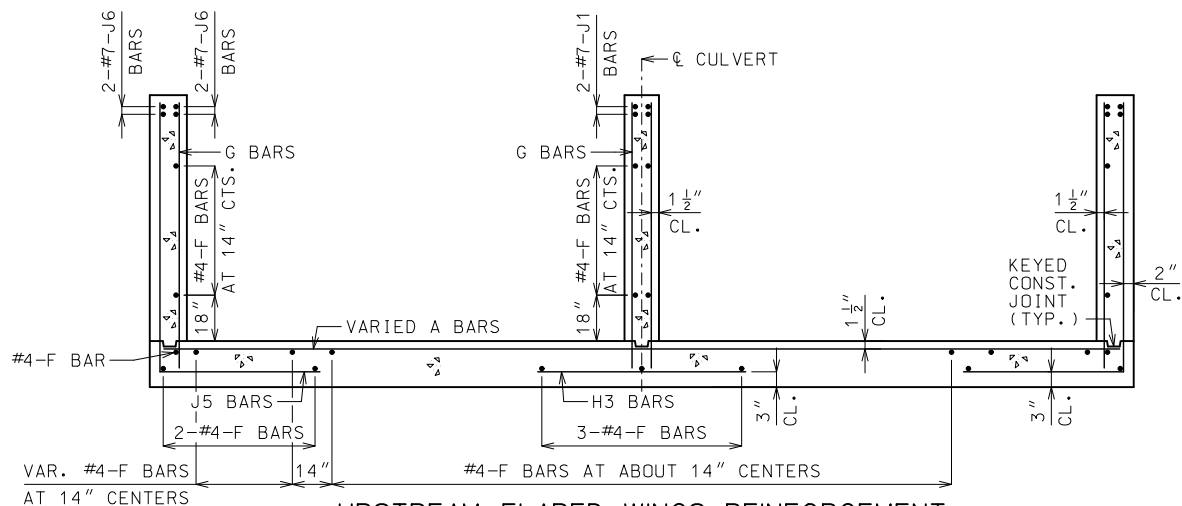


DOWNSTREAM HEADWALL  
REINFORCEMENT  
NEAR INTERIOR WALL

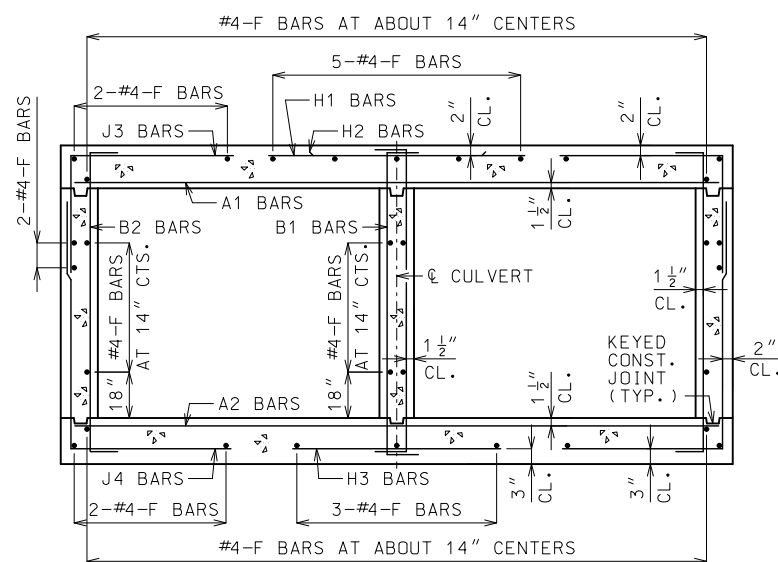


DOWNSTREAM HEADWALL  
REINFORCEMENT  
NEAR MIDSPAN

IF D2 AND D4 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF  $\emptyset$  WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

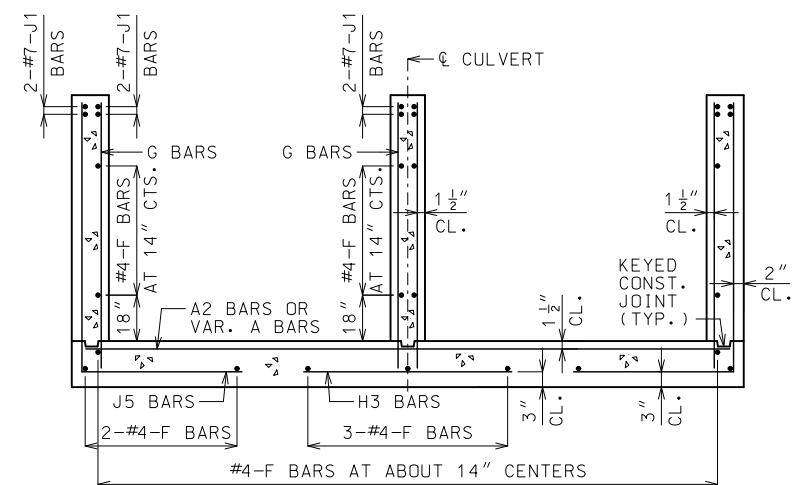


UPSTREAM FLARED WINGS REINFORCEMENT

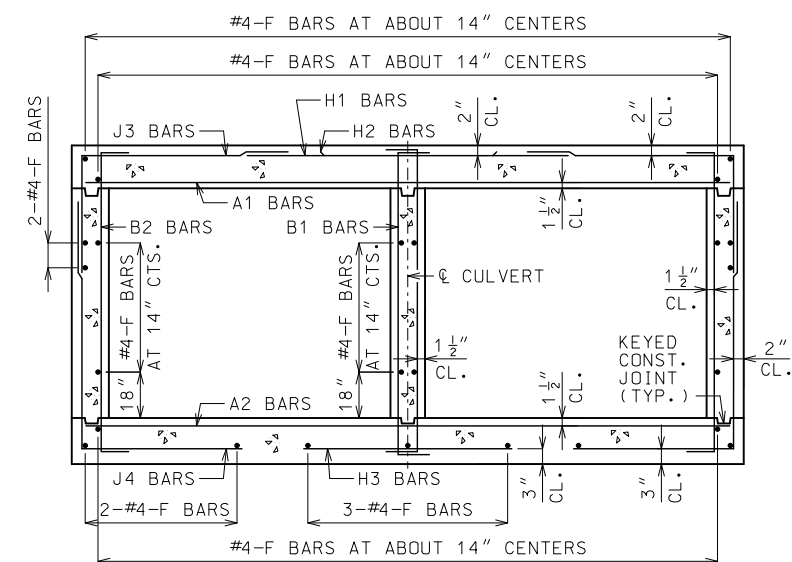


BARREL REINFORCEMENT

FOR DESIGN FILLS OVER 2'-0"



DOWNSTREAM WINGS REINFORCEMENT



BARREL REINFORCEMENT

FOR DESIGN FILLS 2'-0" OR LESS

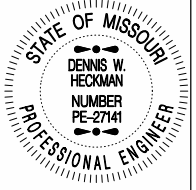
#### GENERAL NOTES:

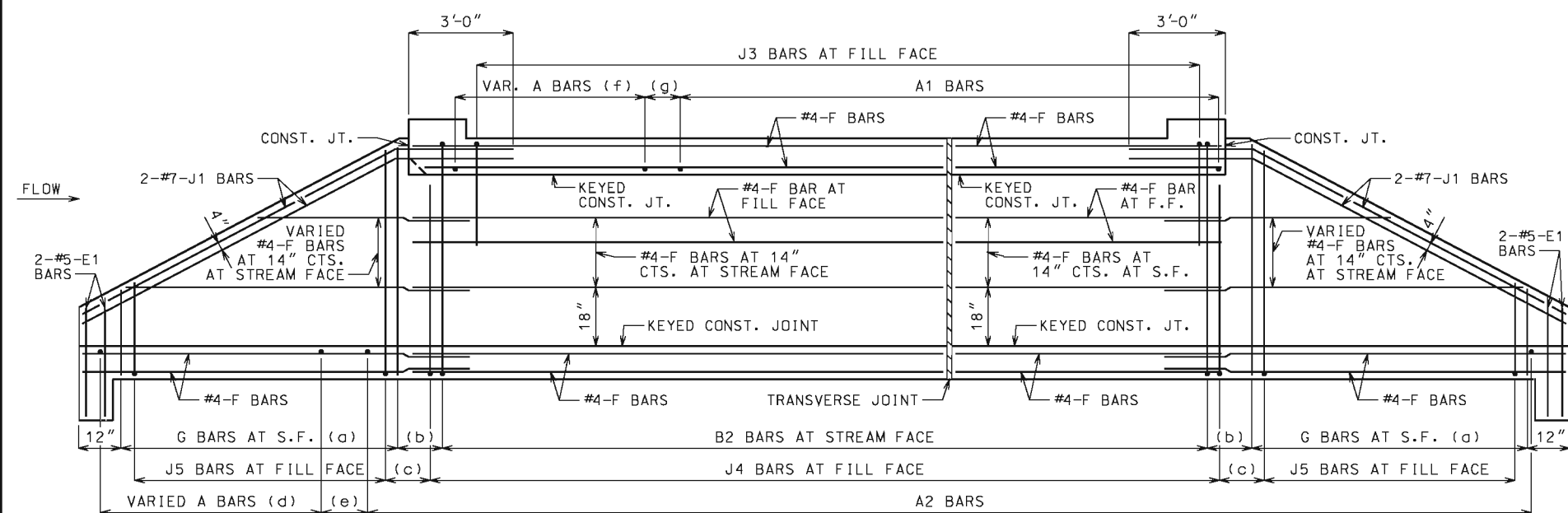
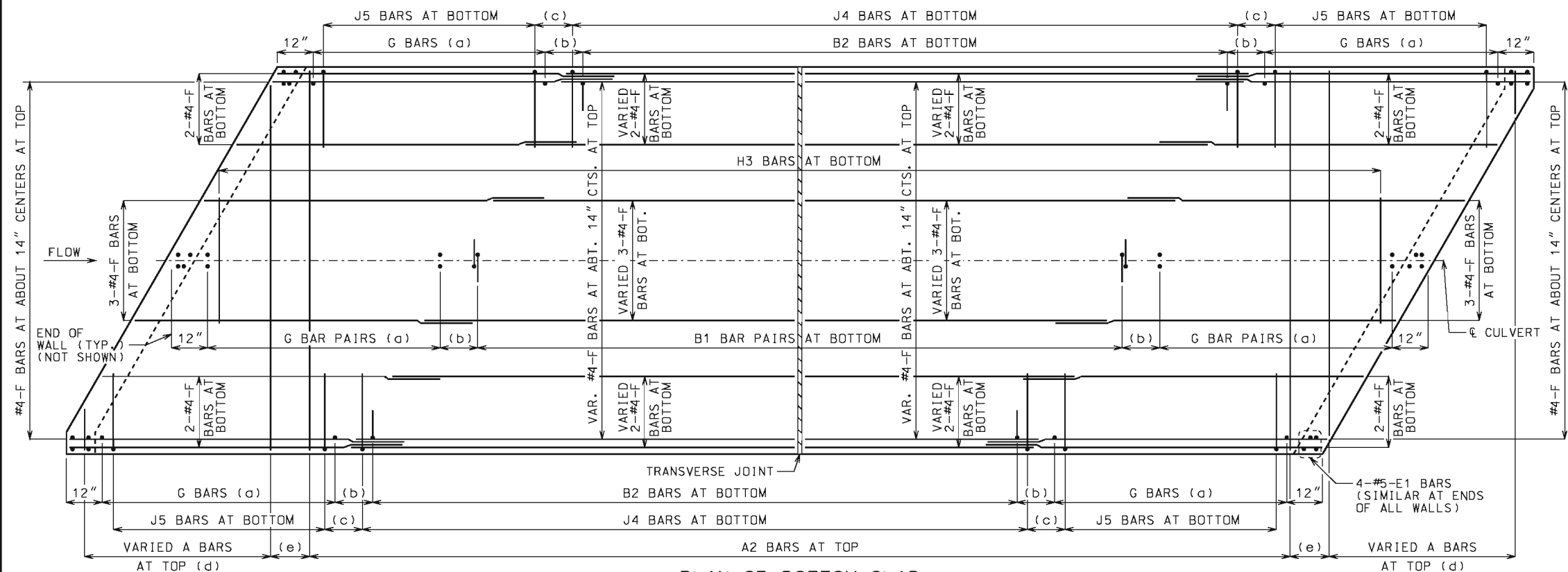
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO  $\emptyset$  CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

|                                                                                                                                                                                 |                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                                    |                                                                                               |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                                                |                                                                                               |
|  <b>STATE OF MISSOURI</b><br>DENNIS W. HECKMAN<br>NUMBER PE-27141<br>PROFESSIONAL ENGINEER | <b>CONCRETE<br/>DOUBLE BOX CULVERT</b><br>SKEW: LEFT ADVANCE<br>WINGS: FLARED<br><br>SECTIONS |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                                                         | <b>703.43H</b><br>SHEET NO.<br>3 OF 3                                                         |



J1 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.46.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

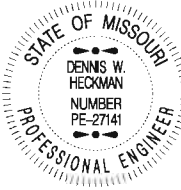
(c) J4 BAR SPACING

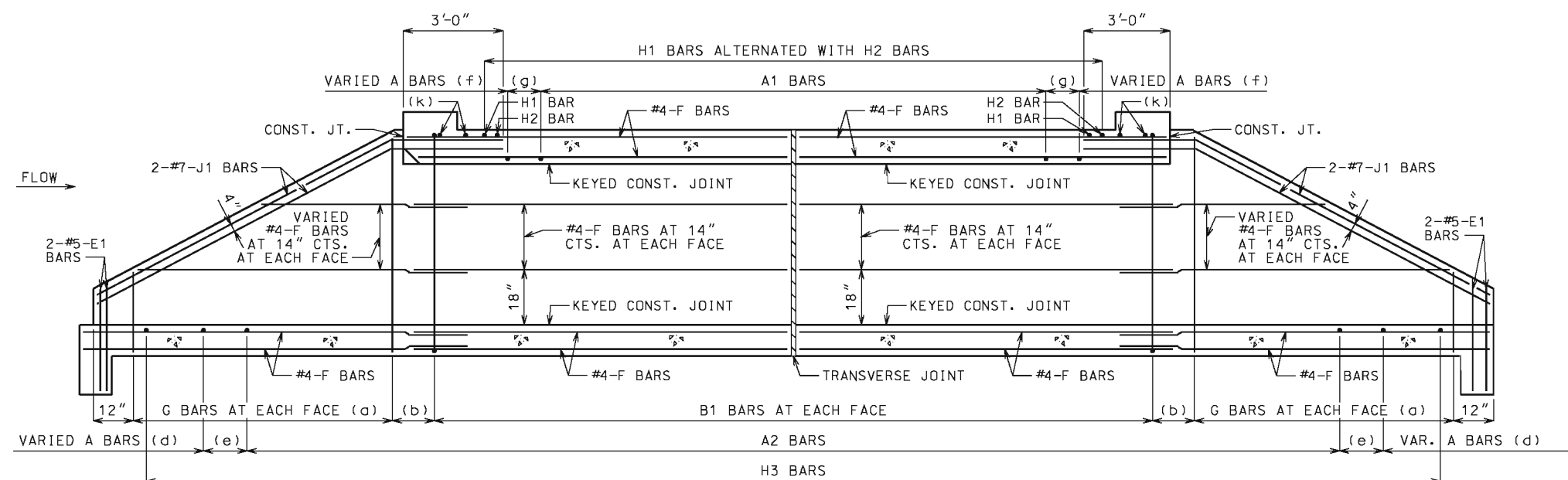
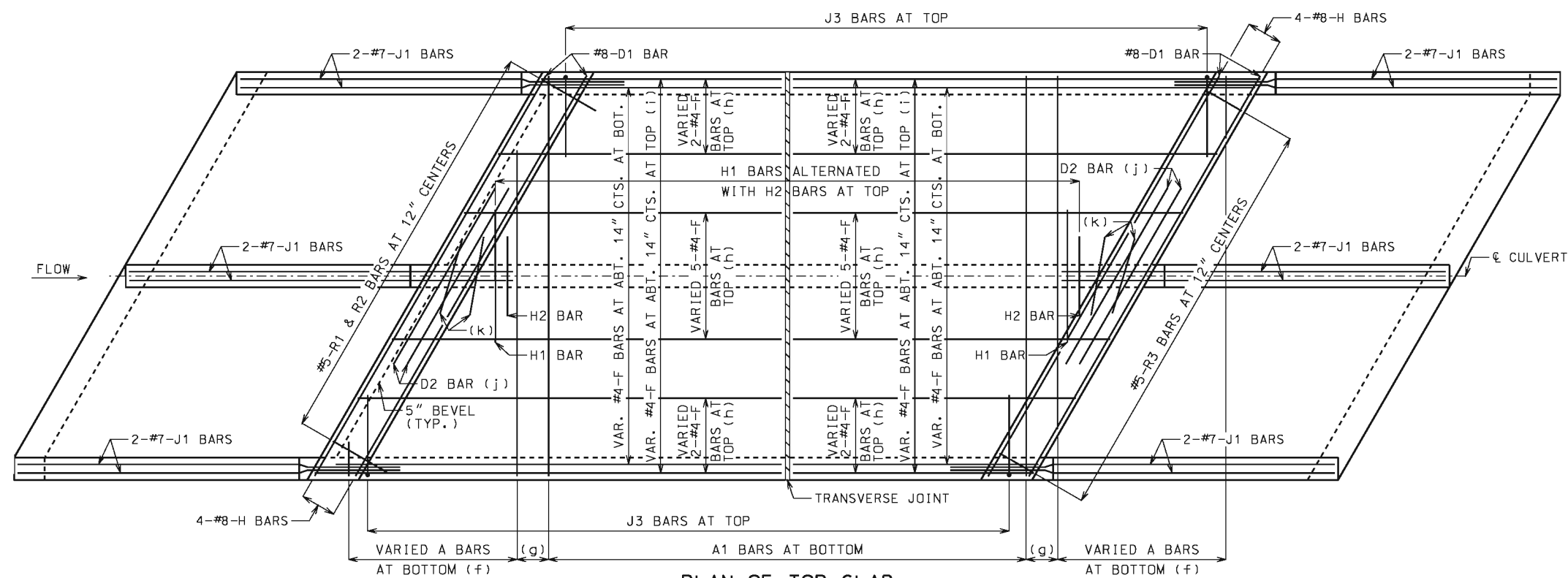
(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING

|                                                                                                                                                                                                                                  |                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                                  |
|                                                                                                                                             | <b>CONCRETE<br/>DOUBLE BOX CULVERT</b><br><br>SKEW: RIGHT ADVANCE<br>WINGS: STRAIGHT<br><br><b>REINFORCEMENT</b> |
| DATE EFFECTIVE: 10/01/2011<br>DATE PREPARED: 5/13/2015                                                                                                                                                                           | <b>703.44H</b>                                                                                                   |
| SHEET NO.<br>1 OF 3                                                                                                                                                                                                              |                                                                                                                  |



SHEET NO.  
2 OF 3



PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



(b) #8 FOR CLEAR SPAN > 10'-0"  
#9 FOR CLEAR SPAN > 13'-0"  
NOT REQUIRED FOR CLEAR SPANS ≤ 10'-0"



FOR DESIGN FILLS OVER 2'-0"



IF D2 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



FOR DESIGN FILLS 2'-0" OR LESS

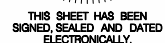
GENERAL NOTES:

FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW  
DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

CONCRETE  
DOUBLE BOX CULVERT

SKEW: RIGHT ADVANCE  
WINGS: STRAIGHT

## SECTIONS

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

703.44H

SHEET NO.  
3 OF 3

UNLESS SHOWN ON BRIDGE PLANS

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE  
SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE  
JOINT.

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

FOR CUT SECTION DETAILS, SEE 703.46.



FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF  
3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT  
EXCEPT J5 BARS, SEE 703.47. FOR J5 BARS, SEE 703.37.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(c) J4 BAR SPACING

(e) A2 BAR SPACING



SKEW: RIGHT ADVANCE  
WINGS: FLARED

## REINFORCEMENT

DATE EFFECTIVE: 10/01/2011  
DATE PREPARED: 5/13/2015

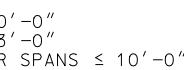
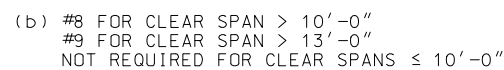
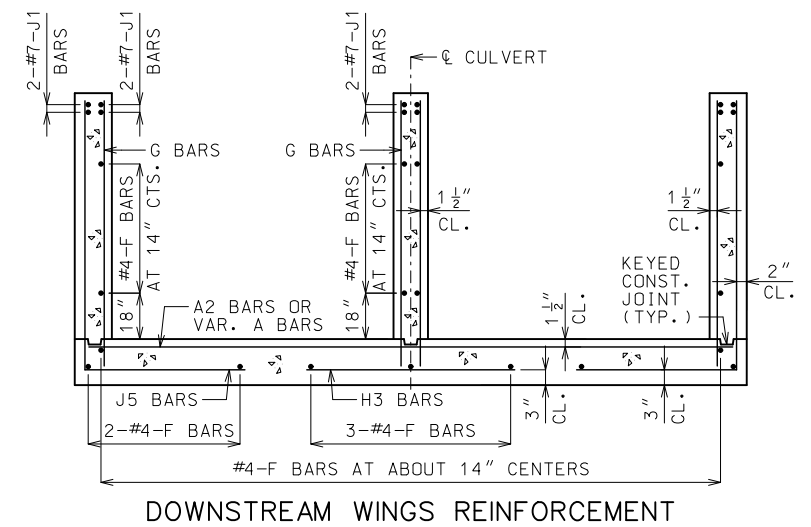
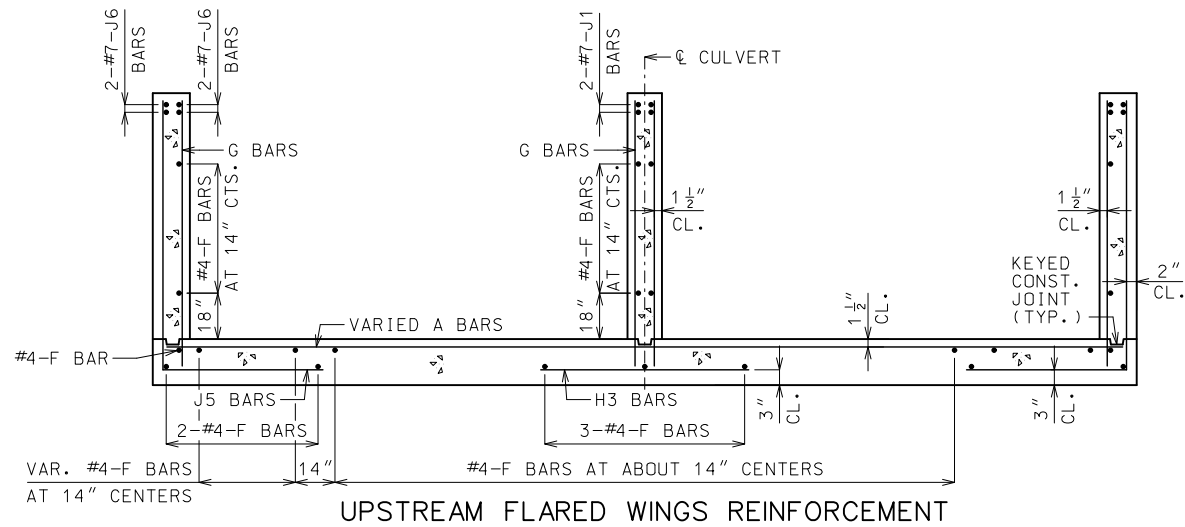
**703.45C**

SHEET NO.  
1 OF 3





FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.

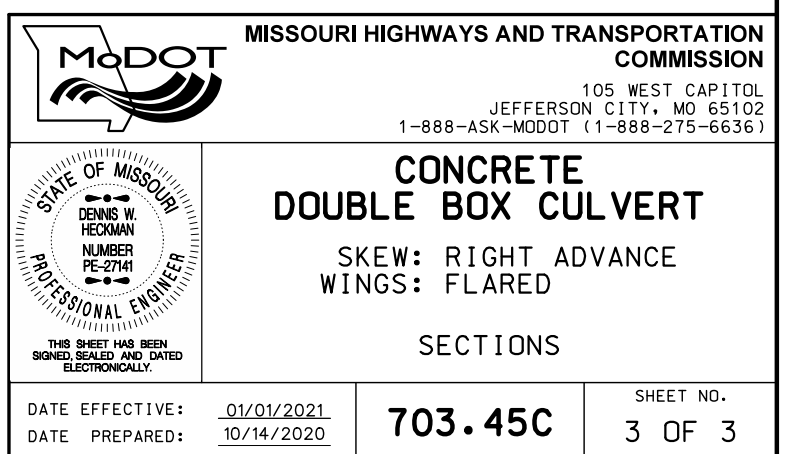


IF D2 AND D4 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF  $\phi$  WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

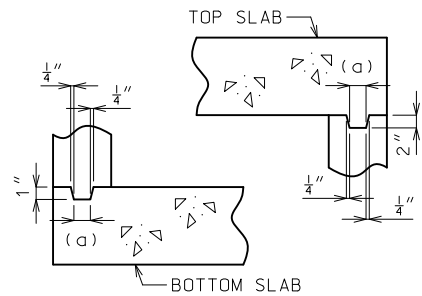
GENERAL NOTES:

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

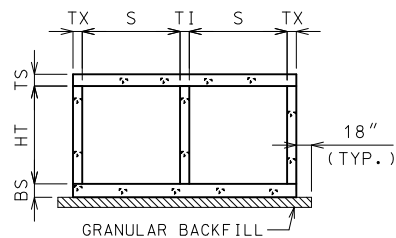
MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".



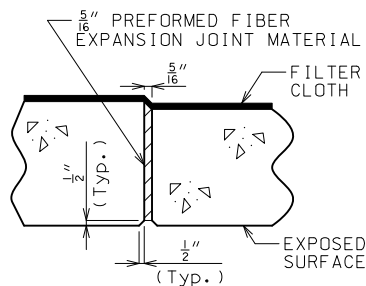




**KEYED CONSTRUCTION JOINT**  
(a) APPROXIMATELY ONE-THIRD OF WALL THICKNESS



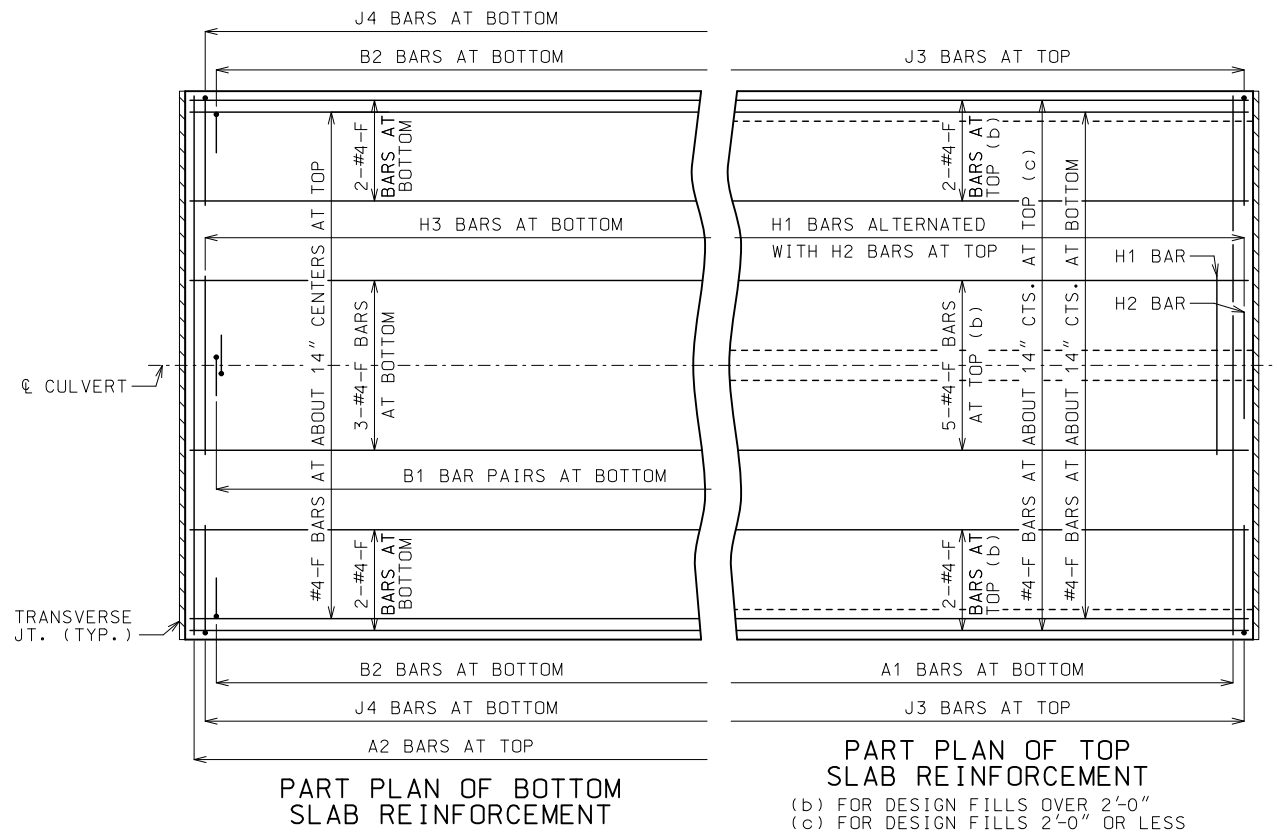
**GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS**



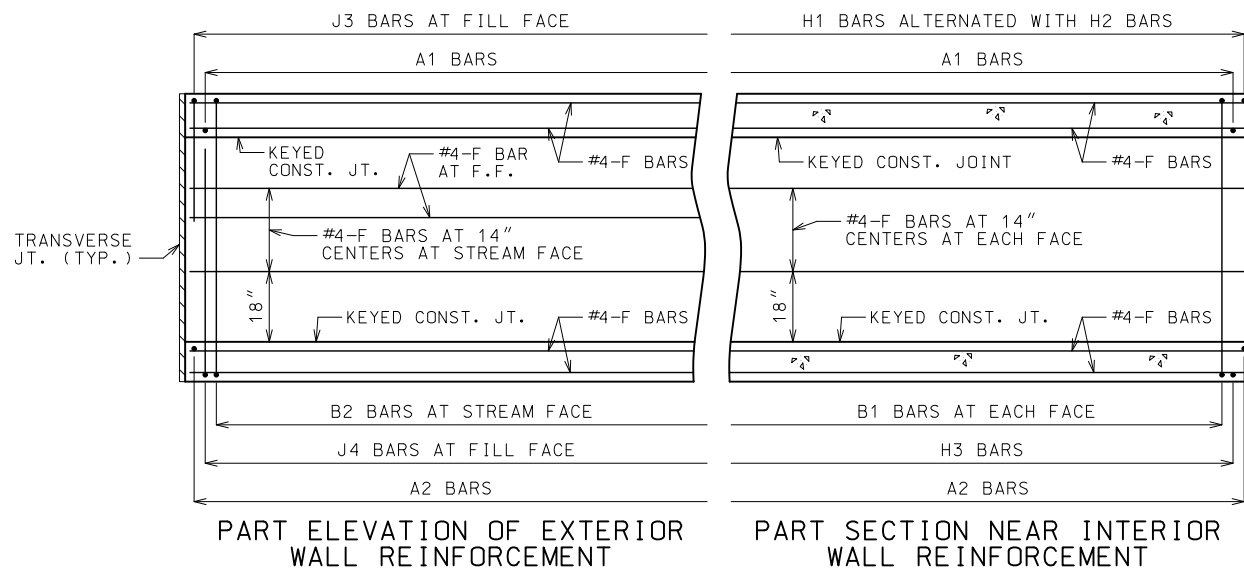
**TRANSVERSE JOINT THRU BARREL**

PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



**PART PLAN OF BOTTOM SLAB REINFORCEMENT**



**PART SECTION NEAR INTERIOR WALL REINFORCEMENT**

### GENERAL NOTES

**DESIGN SPECIFICATIONS:**  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

**DESIGN LOADING:**  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

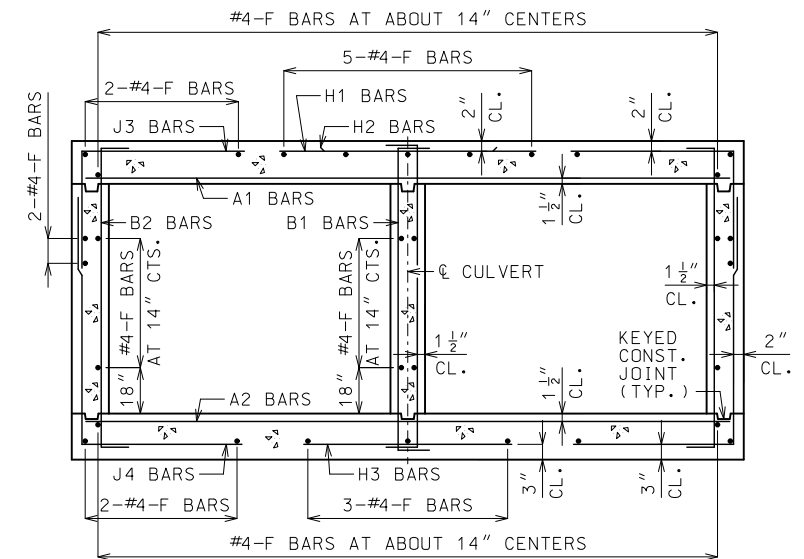
**DESIGN UNIT STRESSES:**  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c = 4,000$  PSI  
REINFORCING STEEL (GRADE 60)  $f_y = 60,000$  PSI

**MISCELLANEOUS:**  
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS, SEE 703.47.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PART PLANS, PART ELEVATION AND PART SECTION.

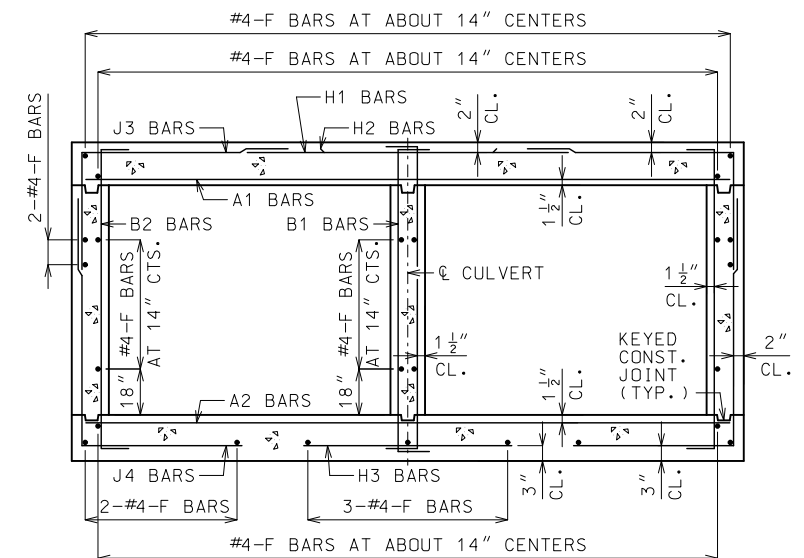
DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".



**BARREL REINFORCEMENT**

FOR DESIGN FILLS OVER 2'-0"  
SYMMETRICAL ABOUT AND NORMAL TO CULVERT.



**BARREL REINFORCEMENT**

FOR DESIGN FILLS 2'-0" OR LESS  
SYMMETRICAL ABOUT AND NORMAL TO CULVERT.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

## CONCRETE DOUBLE BOX CULVERT

CUT SECTION

**703.46**

SHEET NO.  
1 OF 1

| SPAN (S) = 3 FT |                     |    |    |    |               |      |         |      |      |       |       |       |         |      |      |         |                  |      |         |      |         |      |      |       |       |       |         |      |           |         |      | HEIGHT (HT) = 2 FT OR 3 FT OR 4 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------|---------|------------------|------|---------|------|---------|------|------|-------|-------|-------|---------|------|-----------|---------|------|------------------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |      |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |       |         |      | WALL BARS |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |      | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |       | H3 BARS |      |           | B1 BARS |      | B2 BARS                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5   | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |       | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE                               | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=2' | HT=3' | HT=4' |         |      |      |         |                  |      |         |      |         |      |      | HT=2' | HT=3' | HT=4' |         |      |           |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 10                  | 8  | 8  | 8  | 4             | 8.5  | 4       | 10.5 | 23.8 | 26.0  | 26.0  | 26.0  | 4       | 24   | 39.5 | 4       | 24               | 16.0 | 4       | 12   | 4       | 12   | 35.3 | 28    | 40    | 52    | 4       | 12   | 24.5      | 5       | 12   | 5                                  | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 10                  | 8  | 8  | 8  | 4             | 9    | 4       | 10.5 | 23.8 | 26.0  | 26.0  | 26.0  | 4       | 24   | 39.5 | 4       | 24               | 16.0 | 4       | 12   | 4       | 12   | 33.0 | 28    | 40    | 52    | 4       | 12   | 24.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'-4'           | 10                  | 8  | 8  | 8  | 4             | 9    | 4       | 10.5 | 23.8 | 26.0  | 26.0  | 26.0  | 4       | 24   | 39.5 | 4       | 24               | 16.0 | 4       | 12   | 4       | 12   | 33.0 | 28    | 40    | 52    | 4       | 12   | 24.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 23.8 | 24.0  | 24.0  | 24.0  | 4       | 24   | 39.5 | 4       | 24               | 15.5 | 4       | 12   | 4       | 12   | 30.1 | 28    | 40    | 52    | 4       | 12   | 23.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 30.0 | 24.0  | 24.0  | 24.0  | 4       | 24   | 24.5 | 4       | 24               | 15.0 | 4       | 12   | 4       | 12   | 28.0 | 28    | 40    | 52    | 4       | 12   | 23.0      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 28.0 | 24.0  | 24.0  | 24.0  | 4       | 24   | 23.5 | 4       | 24               | 15.0 | 4       | 12   | 4       | 12   | 27.0 | 28    | 40    | 52    | 4       | 12   | 23.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 25.0 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 14.5 | 4       | 12   | 4       | 12   | 24.6 | 28    | 40    | 52    | 4       | 12   | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.9 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 15.5 | 4       | 12   | 4       | 12   | 24.5 | 28    | 40    | 52    | 4       | 12   | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.8 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 16.0 | 4       | 12   | 4       | 12   | 24.5 | 28    | 40    | 52    | 4       | 11.5 | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.6 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 17.0 | 4       | 12   | 4       | 12   | 24.4 | 28    | 40    | 52    | 4       | 10.5 | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.6 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 17.5 | 4       | 12   | 4       | 12   | 24.4 | 28    | 40    | 52    | 4       | 10   | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 17.5 | 4       | 12   | 4       | 12   | 24.3 | 28    | 40    | 52    | 4       | 9.5  | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 18.0 | 4       | 12   | 4       | 12   | 24.3 | 28    | 40    | 52    | 4       | 9    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 18.0 | 4       | 12   | 4       | 12   | 24.3 | 28    | 40    | 52    | 4       | 8.5  | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 24   | 22.0 | 4       | 24               | 18.0 | 4       | 11   | 4       | 11   | 24.3 | 28    | 40    | 52    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 11   | 24.4 | 24.0  | 24.0  | 24.0  | 4       | 23   | 22.0 | 4       | 23               | 18.0 | 4       | 10.5 | 4       | 10.5 | 24.1 | 28    | 40    | 52    | 4       | 7.5  | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 8                   | 8  | 8  | 8  | 4             | 11.5 | 4       | 10.5 | 24.4 | 24.0  | 24.0  | 24.0  | 4       | 22   | 22.0 | 4       | 22               | 18.0 | 4       | 9    | 4       | 9.5  | 24.1 | 28    | 40    | 52    | 4       | 7.5  | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 8                   | 9  | 8  | 8  | 4             | 11   | 4       | 9.5  | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 21   | 22.0 | 4       | 21               | 18.0 | 4       | 10.5 | 4       | 12   | 24.5 | 29    | 41    | 53    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 8                   | 9  | 8  | 8  | 4             | 10.5 | 4       | 9    | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 20   | 22.0 | 4       | 20               | 18.0 | 4       | 9.5  | 4       | 11.5 | 24.4 | 29    | 41    | 53    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 8                   | 9  | 8  | 8  | 4             | 10   | 4       | 8.5  | 24.4 | 24.0  | 24.0  | 24.0  | 4       | 19   | 22.0 | 4       | 19               | 18.0 | 4       | 9    | 4       | 11   | 24.4 | 29    | 41    | 53    | 4       | 7.5  | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 8                   | 10 | 8  | 8  | 4             | 9.5  | 4       | 8    | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 18   | 22.0 | 4       | 18               | 17.5 | 4       | 10   | 4       | 12   | 24.8 | 30    | 42    | 54    | 4       | 8.5  | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 8                   | 10 | 8  | 8  | 4             | 9    | 4       | 7.5  | 24.5 | 24.0  | 24.0  | 24.0  | 4       | 17   | 22.0 | 4       | 17               | 17.5 | 4       | 9.5  | 4       | 12   | 24.8 | 30    | 42    | 54    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 9                   | 10 | 8  | 8  | 4             | 9    | 4       | 9    | 24.6 | 25.0  | 25.0  | 25.0  | 4       | 19   | 22.0 | 4       | 19               | 17.5 | 4       | 9    | 4       | 11.5 | 24.8 | 30    | 42    | 54    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 9                   | 10 | 8  | 8  | 4             | 9    | 4       | 8.5  | 24.6 | 25.0  | 25.0  | 25.0  | 4       | 18   | 22.0 | 4       | 18               | 17.5 | 4       | 8.5  | 4       | 11   | 24.8 | 30    | 42    | 54    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 9                   | 11 | 8  | 8  | 4             | 8.5  | 4       | 8    | 24.8 | 25.0  | 25.0  | 25.0  | 4       | 18   | 22.0 | 4       | 18               | 17.5 | 4       | 9    | 4       | 10.5 | 25.0 | 31    | 43    | 55    | 4       | 8.5  | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 9                   | 11 | 8  | 8  | 4             | 8    | 4       | 7.5  | 24.8 | 25.0  | 25.0  | 25.0  | 4       | 17   | 22.0 | 4       | 17               | 17.5 | 4       | 8.5  | 4       | 10.5 | 25.0 | 31    | 43    | 55    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 10                  | 11 | 8  | 8  | 4             | 8.5  | 4       | 8    | 24.9 | 26.0  | 26.0  | 26.0  | 4       | 19   | 21.5 | 4       | 19               | 17.5 | 4       | 8.5  | 4       | 10.5 | 25.1 | 31    | 43    | 55    | 4       | 8    | 22.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

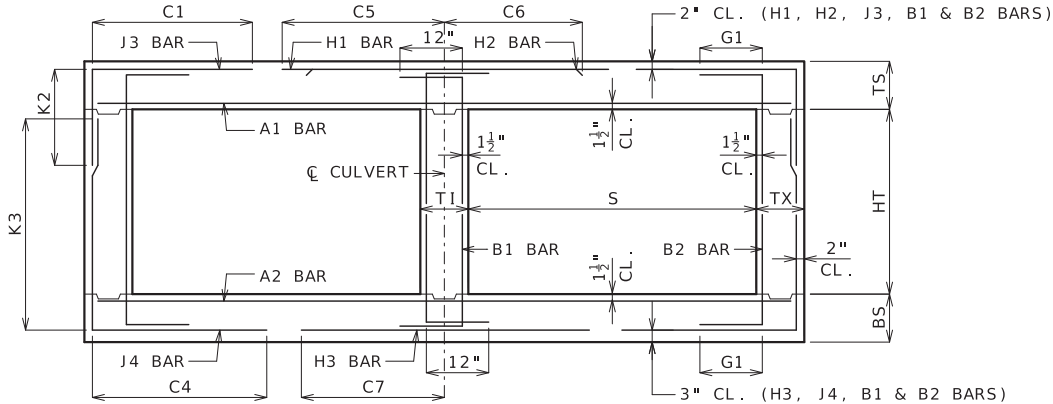
| SPAN (S) = 3 FT |                     |       |       |       |               |       |         |       |       |       |         |       |         |       |         |       |                  |       |       |       |         |       |         |       |         |       |           | HEIGHT (HT) = 5 FT OR 6 FT |       |       |      |    |  |  |  |  |  |  |  |
|-----------------|---------------------|-------|-------|-------|---------------|-------|---------|-------|-------|-------|---------|-------|---------|-------|---------|-------|------------------|-------|-------|-------|---------|-------|---------|-------|---------|-------|-----------|----------------------------|-------|-------|------|----|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |       |       |       | TOP SLAB BARS |       |         |       |       |       |         |       |         |       |         |       | BOTTOM SLAB BARS |       |       |       |         |       |         |       |         |       | WALL BARS |                            |       |       |      |    |  |  |  |  |  |  |  |
|                 |                     |       |       |       | A1 BARS       |       | J3 BARS |       |       |       | H1 BARS |       | H2 BARS |       | A2 BARS |       | J4 BARS          |       |       |       | H3 BARS |       | B1 BARS |       | B2 BARS |       |           |                            |       |       |      |    |  |  |  |  |  |  |  |
|                 | SIZE                | SPA.  | SIZE  | SPA.  | C1            | K2    |         | SIZE  | SPA.  | C5    | SIZE    | SPA.  | C6      | SIZE  | SPA.    | C4    | K3               |       | SIZE  | SPA.  | C7      | SIZE  | SPA.    | SIZE  | SPA.    | SIZE  | SPA.      | G1                         |       |       |      |    |  |  |  |  |  |  |  |
|                 | HT=5'               | HT=6' | HT=5' | HT=6' | HT=5'         | HT=6' | HT=5'   | HT=6' | HT=5' | HT=6' | HT=5'   | HT=6' | HT=5'   | HT=6' | HT=5'   | HT=6' | HT=5'            | HT=6' | HT=5' | HT=6' | HT=5'   | HT=6' | HT=5'   | HT=6' | HT=5'   | HT=6' | HT=5'     | HT=6'                      | HT=5' | HT=6' |      |    |  |  |  |  |  |  |  |
| 1 FT            | 10                  | 8     | 8     | 8     | 4             | 8.5   | 4       | 10.5  | 23.8  | 26.0  | 26.0    | 4     | 24      | 39.5  | 4       | 24    | 16.0             | 4     | 12    | 4     | 11.5    | 39.0  | 64      | 76    | 4       | 12    | 24.5      | 5                          | 12    | 5     | 12   | 12 |  |  |  |  |  |  |  |
| 2 FT            | 10                  | 8     | 8     | 8     | 4             | 8.5   | 4       | 10.5  | 23.8  | 26.0  | 26.0    | 4     | 24      | 39.5  | 4       | 24    | 16.0             | 4     | 12    | 4     | 11      | 39.9  | 64      | 76    | 4       | 11.5  | 24.5      | 5                          | 12    | 5     | 12   | 12 |  |  |  |  |  |  |  |
| 2'- 4'          | 10                  | 8     | 8     | 8     | 4             | 8.5   | 4       | 10.5  | 23.8  | 26.0  | 26.0    | 4     | 24      | 39.5  | 4       | 24    | 16.0             | 4     | 12    | 4     | 10      | 39.9  | 64      | 76    | 4       | 11.5  | 24.5      | 5                          | 12    | 5     | 12   | 12 |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 12    | 23.8  | 24.0  | 24.0    | 4     | 24      | 39.5  | 4       | 24    | 15.0             | 4     | 12    | 4     | 10      | 38.6  | 64      | 76    | 4       | 12    | 23.5      | 5                          | 12    | 5     | 12   | 12 |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 12    | 36.9  | 24.0  | 24.0    | 4     | 24      | 25.0  | 4       | 24    | 14.5             | 4     | 12    | 4     | 9.5     | 36.9  | 64      | 76    | 4       | 12    | 23.0      | 5                          | 12    | 5     | 12   | 12 |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 12    | 38.6  | 24.0  | 24.0    | 4     | 24      | 23.5  | 4       | 24    | 15.0             | 4     | 12    | 4     | 9       | 35.8  | 64      | 76    | 4       | 12    | 23.0      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 12    | 33.1  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 14.0             | 4     | 12    | 4     | 9.5     | 32.8  | 64      | 76    | 4       | 12    | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 12    | 32.8  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 15.0             | 4     | 12    | 4     | 9       | 32.5  | 64      | 76    | 4       | 12    | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 11    | 32.4  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 16.0             | 4     | 12    | 4     | 8.5     | 32.3  | 64      | 76    | 4       | 12    | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 10    | 32.1  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 16.5             | 4     | 12    | 4     | 8       | 32.1  | 64      | 76    | 4       | 11.5  | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 9     | 32.0  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 17.0             | 4     | 12    | 4     | 7.5     | 32.0  | 64      | 76    | 4       | 11    | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 8     | 31.8  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 17.0             | 4     | 12    | 4     | 7       | 31.9  | 64      | 76    | 4       | 10    | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 7.5   | 31.6  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 17.5             | 4     | 12    | 4     | 6.5     | 31.8  | 64      | 76    | 4       | 9.5   | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 24 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 7     | 31.6  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 17.5             | 4     | 12    | 4     | 6       | 31.6  | 64      | 76    | 4       | 9.5   | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 26 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 6.5   | 31.5  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 17.5             | 4     | 11.5  | 5     | 6.5     | 31.6  | 64      | 76    | 4       | 9     | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 28 FT           | 8                   | 8     | 8     | 8     | 4             | 12    | 4       | 6     | 31.5  | 24.0  | 24.0    | 4     | 24      | 21.5  | 4       | 24    | 17.5             | 4     | 10.5  | 5     | 6       | 31.5  | 64      | 76    | 4       | 8.5   | 22.5      | 5                          | 12    | 5     | 12   | 0  |  |  |  |  |  |  |  |
| 30 FT           | 8                   | 9     | 8     | 8     | 4             | 12    | 5       | 6.5   | 31.3  | 24.0  | 28.0    | 4     | 24      | 21.5  | 4       | 24    | 17.5             | 4     | 11.5  | 5     | 6.5     | 32.8  | 65      | 77    | 4       | 10    | 22.5      | 5                          | 12    | 5     | 11.5 | 0  |  |  |  |  |  |  |  |
| 32 FT           | 8                   | 9     | 8     | 8     | 4             | 11    | 5       | 6     | 31.3  | 24.0  | 28.0    | 4     | 24      | 21.5  | 4       | 24    | 17.5             | 4     | 11    | 5     | 6       | 32.6  | 65      | 77    | 4       | 9.5   | 22.5      | 5                          | 12    | 5     | 11   | 0  |  |  |  |  |  |  |  |
| 34 FT           | 8                   | 9     | 8     | 8     | 4             | 10.5  | 5       | 6     | 31.3  | 24.0  | 28.0    | 4     | 23      | 21.5  | 4       | 23    | 17.5             | 4     | 10    | 5     | 6       | 32.6  | 65      | 77    | 4       | 9     | 22.5      | 5                          | 12    | 5     | 10.5 | 0  |  |  |  |  |  |  |  |
| 36 FT           | 8                   | 10    | 8     | 8     | 4             | 10    | 6       | 7.5   | 34.1  | 24.0  | 28.0    | 4     | 22      | 21.5  | 4       | 22    | 17.5             | 4     | 11    | 5     | 6       | 33.5  | 66      | 78    | 4       | 10.5  | 22.5      | 5                          | 12    | 5     | 10   | 0  |  |  |  |  |  |  |  |
| 38 FT           | 8                   | 10    | 8     | 8     | 4             | 9.5   | 6       | 7.5   | 34.1  | 24.0  | 28.0    | 4     | 21      | 21.5  | 4       | 21    | 17.5             | 4     | 10.5  | 5     | 6       | 33.5  | 66      | 78    | 4       | 10    | 22.5      | 5                          | 12    | 5     | 9.5  | 0  |  |  |  |  |  |  |  |
| 40 FT           | 9                   | 10    | 8     | 8     | 4             | 10    | 5       | 6     | 31.9  | 25.0  | 29.0    | 4     | 24      | 21.0  | 4       | 24    | 17.5             | 4     | 10    | 6     | 7       | 36.4  | 66      | 78    | 4       | 9.5   | 22.5      | 5                          | 12    | 5     | 9.5  | 0  |  |  |  |  |  |  |  |
| 42 FT           | 9                   | 10    | 8     | 8     | 4             | 9.5   | 5       | 6     | 31.9  | 25.0  | 29.0    | 4     | 23      | 21.0  | 4       | 23    | 17.5             | 4     | 9.5   | 6     | 7       | 36.3  | 66      | 78    | 4       | 9     | 22.5      | 5                          | 12    | 5     | 9.5  | 0  |  |  |  |  |  |  |  |
| 44 FT           | 9                   | 10    | 8     | 8     | 4             | 9     | 6       | 7     | 34.9  | 25.0  | 33.0    | 4     | 22      | 21.0  | 4       | 22    | 17.5             | 4     | 9     | 6     | 6.5     | 36.3  | 66      | 78    | 4       | 8.5   | 22.5      | 5                          | 12    | 5     | 9.5  | 0  |  |  |  |  |  |  |  |
| 46 FT           | 10                  | 11    | 8     | 8     | 4             | 9.5   | 5       | 6     | 32.8  | 26.0  | 30.0    | 4     | 24      | 20.5  | 4       | 24    | 17.0             | 4     | 10    | 6     | 7       | 36.9  | 67      | 79    | 4       | 9.5   | 22.5      | 5                          | 12    | 5     | 9.5  | 0  |  |  |  |  |  |  |  |
| 48 FT           | 10                  | 11    | 8     | 8     | 4             | 9     | 6       | 7     | 35.8  | 26.0  | 34.0    | 4     | 24      | 20.5  | 4       | 24    | 17.5             | 4     | 9.5   | 6     | 6.5     | 36.9  | 67      | 79    | 4       | 9     | 22.5      | 5                          | 12    | 5     | 9.5  | 0  |  |  |  |  |  |  |  |
| 50 FT           | 10                  | 11    | 8     | 8     | 4             | 8.5   | 6       | 7     | 35.6  | 26.0  | 34.0    | 4     | 24      | 20.5  | 4       | 24    | 17.5             | 4     | 9     | 6     | 6.5     | 36.9  | 67      | 79    | 4       | 9     | 22.5      | 5                          | 12    | 5     | 9.5  | 0  |  |  |  |  |  |  |  |

| SPAN (S) = 4 FT |                     |    |    |    |               |      |         |      |      |       |         |      |         |      |         |      |                  |      |      |    |         |       |         |      |         |      |           |      |      | HEIGHT (HT) = 2 FT OR 3 FT |    |    |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|---------|------|---------|------|------------------|------|------|----|---------|-------|---------|------|---------|------|-----------|------|------|----------------------------|----|----|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |         |      |         |      | BOTTOM SLAB BARS |      |      |    |         |       |         |      |         |      | WALL BARS |      |      |                            |    |    |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |      |      |    | H3 BARS |       | B1 BARS |      | B2 BARS |      |           |      |      |                            |    |    |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA.    | C5   | SIZE    | SPA. | C6               | SIZE | SPA. | C4 | K3      |       | SIZE    | SPA. | C7      | SIZE | SPA.      | SIZE | SPA. | G1                         |    |    |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=2' | HT=3'   |      |         |      |         |      |                  |      |      |    | HT=2'   | HT=3' |         |      |         |      |           |      |      |                            |    |    |  |  |  |  |  |  |  |
| 1 FT            | 10                  | 8  | 8  | 8  | 4             | 7    | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.5             | 4    | 12   | 4  | 12      | 29.3  | 28      | 40   | 4       | 9.5  | 28.0      | 5    | 12   | 5                          | 12 | 12 |  |  |  |  |  |  |  |
| 2 FT            | 10                  | 8  | 8  | 8  | 4             | 7    | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.0             | 4    | 12   | 4  | 12      | 27.3  | 28      | 40   | 4       | 9    | 27.5      | 5    | 12   | 5                          | 12 | 12 |  |  |  |  |  |  |  |
| 2' - 4'         | 10                  | 8  | 8  | 8  | 4             | 7    | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.0             | 4    | 12   | 4  | 12      | 27.3  | 28      | 40   | 4       | 9    | 27.5      | 5    | 12   | 5                          | 12 | 12 |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 26.3 | 24.0  | 24.0    | 4    | 24      | 34.0 | 4       | 24   | 19.0             | 4    | 12   | 4  | 12      | 25.0  | 28      | 40   | 4       | 9.5  | 27.0      | 5    | 12   | 5                          | 12 | 12 |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.8 | 24.0  | 24.0    | 4    | 24      | 28.5 | 4       | 24   | 19.0             | 4    | 12   | 4  | 12      | 24.0  | 28      | 40   | 4       | 9.5  | 26.5      | 5    | 12   | 5                          | 12 | 12 |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.1 | 24.0  | 24.0    | 4    | 24      | 27.0 | 4       | 24   | 19.0             | 4    | 12   | 4  | 12      | 23.4  | 28      | 40   | 4       | 9    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 22.6 | 24.0  | 24.0    | 4    | 24      | 25.5 | 4       | 24   | 18.5             | 4    | 12   | 4  | 12      | 22.1  | 28      | 40   | 4       | 9    | 25.5      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 22.5 | 24.0  | 24.0    | 4    | 24      | 25.5 | 4       | 24   | 18.5             | 4    | 12   | 4  | 12      | 22.1  | 28      | 40   | 4       | 8    | 25.5      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 22.5 | 24.0  | 24.0    | 4    | 22      | 25.5 | 4       | 22   | 18.5             | 4    | 12   | 4  | 12      | 22.1  | 28      | 40   | 4       | 7.5  | 25.5      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 22.5 | 24.0  | 24.0    | 4    | 20      | 25.5 | 4       | 20   | 18.5             | 4    | 11   | 4  | 12      | 22.1  | 28      | 40   | 4       | 7    | 25.5      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 22.5 | 24.0  | 24.0    | 4    | 18      | 25.5 | 4       | 18   | 18.5             | 4    | 10   | 4  | 11.5    | 22.0  | 28      | 40   | 4       | 6.5  | 25.5      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 8  | 8  | 8  | 4             | 10.5 | 4       | 11.5 | 22.5 | 24.0  | 24.0    | 4    | 17      | 25.5 | 4       | 17   | 18.5             | 4    | 9    | 4  | 10.5    | 22.0  | 28      | 40   | 4       | 6    | 25.5      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 9  | 8  | 8  | 4             | 10   | 4       | 10.5 | 22.6 | 24.0  | 24.0    | 4    | 15      | 25.5 | 4       | 15   | 18.5             | 4    | 9    | 4  | 12      | 21.4  | 29      | 41   | 4       | 6.5  | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 24 FT           | 8                   | 9  | 8  | 8  | 4             | 9    | 4       | 9.5  | 22.6 | 24.0  | 24.0    | 4    | 14      | 25.5 | 4       | 14   | 18.5             | 4    | 8.5  | 4  | 12      | 21.4  | 29      | 41   | 4       | 6    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 26 FT           | 8                   | 10 | 8  | 8  | 4             | 8.5  | 4       | 8.5  | 22.8 | 24.0  | 24.0    | 4    | 13      | 25.5 | 4       | 13   | 18.5             | 4    | 8.5  | 4  | 12      | 20.9  | 30      | 42   | 4       | 6.5  | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 28 FT           | 8                   | 10 | 8  | 8  | 4             | 7.5  | 4       | 8    | 22.8 | 24.0  | 24.0    | 4    | 12      | 25.5 | 4       | 12   | 18.5             | 4    | 8    | 4  | 12      | 20.9  | 30      | 42   | 4       | 6.5  | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 30 FT           | 9                   | 10 | 8  | 8  | 4             | 8    | 4       | 10.5 | 22.3 | 25.0  | 25.0    | 4    | 13      | 25.5 | 4       | 13   | 18.5             | 4    | 7.5  | 4  | 12      | 21.0  | 30      | 42   | 4       | 6    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 32 FT           | 9                   | 11 | 8  | 8  | 4             | 7.5  | 4       | 10   | 22.4 | 25.0  | 25.0    | 4    | 12      | 25.5 | 4       | 12   | 18.5             | 4    | 8    | 4  | 10.5    | 20.6  | 31      | 43   | 4       | 6.5  | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 34 FT           | 10                  | 11 | 8  | 8  | 4             | 7.5  | 4       | 10.5 | 22.0 | 26.0  | 26.0    | 4    | 13      | 25.0 | 4       | 13   | 18.5             | 4    | 7.5  | 4  | 10.5    | 20.9  | 31      | 43   | 4       | 6    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 36 FT           | 10                  | 12 | 8  | 8  | 4             | 7.5  | 4       | 10   | 22.1 | 26.0  | 26.0    | 4    | 12      | 25.0 | 4       | 12   | 18.5             | 4    | 7.5  | 4  | 9.5     | 20.6  | 32      | 44   | 4       | 6.5  | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 38 FT           | 10                  | 12 | 8  | 8  | 4             | 7    | 4       | 9.5  | 22.1 | 26.0  | 26.0    | 4    | 12      | 25.0 | 4       | 12   | 18.5             | 4    | 7.5  | 4  | 9.5     | 20.6  | 32      | 44   | 4       | 6    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 40 FT           | 11                  | 12 | 8  | 8  | 4             | 7    | 4       | 9.5  | 21.8 | 27.0  | 27.0    | 4    | 13      | 25.0 | 4       | 13   | 18.5             | 4    | 7    | 4  | 9.5     | 20.9  | 32      | 44   | 4       | 6    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 42 FT           | 11                  | 13 | 8  | 8  | 4             | 6.5  | 4       | 9.5  | 21.9 | 27.0  | 27.0    | 4    | 12      | 25.0 | 4       | 12   | 18.5             | 4    | 7    | 4  | 8.5     | 20.6  | 33      | 45   | 4       | 6    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 44 FT           | 11                  | 13 | 8  | 8  | 4             | 6.5  | 4       | 9    | 21.9 | 27.0  | 27.0    | 4    | 12      | 25.0 | 4       | 12   | 18.5             | 4    | 7    | 4  | 8.5     | 20.6  | 33      | 45   | 4       | 6    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 46 FT           | 12                  | 13 | 8  | 8  | 4             | 6.5  | 4       | 8.5  | 21.6 | 28.0  | 28.0    | 4    | 12      | 24.5 | 4       | 12   | 18.5             | 4    | 6.5  | 4  | 8.5     | 20.9  | 33      | 45   | 5       | 8.5  | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 48 FT           | 12                  | 13 | 8  | 8  | 4             | 6.5  | 4       | 8.5  | 21.6 | 28.0  | 28.0    | 4    | 12      | 24.5 | 4       | 12   | 18.5             | 4    | 6    | 4  | 8.5     | 20.9  | 33      | 45   | 5       | 8.5  | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |
| 50 FT           | 12                  | 14 | 8  | 8  | 4             | 6    | 4       | 8.5  | 21.8 | 28.0  | 28.0    | 4    | 12      | 24.5 | 4       | 12   | 18.5             | 4    | 6.5  | 4  | 7.5     | 20.8  | 34      | 46   | 5       | 9    | 26.0      | 5    | 12   | 5                          | 12 | 0  |  |  |  |  |  |  |  |

| SPAN (S) = 4 FT |                     |      |      |      |               |      |         |      |      |       |         |      |         |      |         |      |                  |    |      |       |         |      |         |      |         |      |      | HEIGHT (HT) = 4 FT OR 5 FT |           |   |      |    |  |  |  |  |  |  |  |
|-----------------|---------------------|------|------|------|---------------|------|---------|------|------|-------|---------|------|---------|------|---------|------|------------------|----|------|-------|---------|------|---------|------|---------|------|------|----------------------------|-----------|---|------|----|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |      |         |      |      |       |         |      |         |      |         |      | BOTTOM SLAB BARS |    |      |       |         |      |         |      |         |      |      |                            | WALL BARS |   |      |    |  |  |  |  |  |  |  |
|                 |                     |      |      |      | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |    |      |       | H3 BARS |      | B1 BARS |      | B2 BARS |      |      |                            |           |   |      |    |  |  |  |  |  |  |  |
|                 | SIZE                | SPA. | SIZE | SPA. | C1            | K2   |         | SIZE | SPA. | C5    | SIZE    | SPA. | C6      | SIZE | SPA.    | SIZE | SPA.             | C4 | K3   |       | SIZE    | SPA. | C7      | SIZE | SPA.    | SIZE | SPA. | G1                         |           |   |      |    |  |  |  |  |  |  |  |
|                 | TS                  | BS   | TX   | TI   |               |      |         |      |      | HT=4' | HT=5'   |      |         |      |         |      |                  |    |      | HT=4' | HT=5'   |      |         |      |         |      |      |                            |           |   |      |    |  |  |  |  |  |  |  |
| 1 FT            | 10                  | 8    | 8    | 8    | 4             | 7    | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.5             | 4  | 12   | 4     | 12      | 39.9 | 52      | 64   | 4       | 9    | 28.0 | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 2 FT            | 10                  | 8    | 8    | 8    | 4             | 7    | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.5             | 4  | 12   | 4     | 12      | 36.8 | 52      | 64   | 4       | 9    | 27.5 | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 2'- 4'          | 10                  | 8    | 8    | 8    | 4             | 7    | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.5             | 4  | 12   | 4     | 12      | 36.8 | 52      | 64   | 4       | 9    | 27.5 | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8    | 8    | 8    | 4             | 12   | 4       | 12   | 27.3 | 24.0  | 24.0    | 4    | 24      | 48.0 | 4       | 24   | 19.5             | 4  | 12   | 4     | 12      | 33.8 | 52      | 64   | 4       | 9    | 27.0 | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8    | 8    | 8    | 4             | 12   | 4       | 12   | 33.5 | 24.0  | 24.0    | 4    | 24      | 28.5 | 4       | 24   | 19.0             | 4  | 12   | 4     | 11.5    | 31.3 | 52      | 64   | 4       | 9    | 26.5 | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8    | 8    | 8    | 4             | 12   | 4       | 12   | 30.6 | 24.0  | 24.0    | 4    | 24      | 27.0 | 4       | 24   | 19.0             | 4  | 12   | 4     | 11      | 29.9 | 52      | 64   | 4       | 8.5  | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8    | 8    | 8    | 4             | 12   | 4       | 12   | 27.4 | 24.0  | 24.0    | 4    | 24      | 25.5 | 4       | 24   | 18.5             | 4  | 12   | 4     | 12      | 27.1 | 52      | 64   | 4       | 9    | 25.5 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8    | 8    | 8    | 4             | 12   | 4       | 12   | 27.1 | 24.0  | 24.0    | 4    | 24      | 25.5 | 4       | 24   | 18.5             | 4  | 12   | 4     | 11      | 26.9 | 52      | 64   | 4       | 8    | 25.5 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8    | 8    | 8    | 4             | 12   | 4       | 12   | 27.0 | 24.0  | 24.0    | 4    | 22      | 25.0 | 4       | 22   | 18.5             | 4  | 12   | 4     | 10.5    | 26.8 | 52      | 64   | 4       | 7.5  | 25.5 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8    | 8    | 8    | 4             | 12   | 4       | 11   | 26.9 | 24.0  | 24.0    | 4    | 21      | 25.0 | 4       | 21   | 18.5             | 4  | 10.5 | 4     | 10      | 26.6 | 52      | 64   | 4       | 7    | 25.5 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8    | 8    | 8    | 4             | 11.5 | 4       | 10   | 26.8 | 24.0  | 24.0    | 4    | 19      | 25.0 | 4       | 19   | 18.5             | 4  | 9.5  | 4     | 9       | 26.6 | 52      | 64   | 4       | 6.5  | 25.5 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 8    | 8    | 8    | 4             | 10.5 | 4       | 9    | 26.6 | 24.0  | 24.0    | 4    | 17      | 25.0 | 4       | 17   | 18.5             | 4  | 8.5  | 4     | 8       | 26.5 | 52      | 64   | 4       | 6    | 25.5 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 9    | 8    | 8    | 4             | 9.5  | 4       | 8    | 26.8 | 24.0  | 24.0    | 4    | 15      | 25.0 | 4       | 15   | 18.5             | 4  | 9    | 4     | 9.5     | 26.8 | 53      | 65   | 4       | 6.5  | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 24 FT           | 8                   | 9    | 8    | 8    | 4             | 9    | 4       | 7.5  | 26.6 | 24.0  | 24.0    | 4    | 14      | 25.0 | 4       | 14   | 18.5             | 4  | 8.5  | 4     | 9       | 26.6 | 53      | 65   | 4       | 6.5  | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 26 FT           | 8                   | 10   | 8    | 8    | 4             | 8.5  | 4       | 6.5  | 26.6 | 24.0  | 24.0    | 4    | 13      | 25.0 | 4       | 13   | 18.5             | 4  | 8.5  | 4     | 10.5    | 26.9 | 54      | 66   | 4       | 7    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 28 FT           | 8                   | 10   | 8    | 8    | 4             | 7.5  | 4       | 6    | 26.6 | 24.0  | 24.0    | 4    | 12      | 25.0 | 4       | 12   | 18.5             | 4  | 8    | 4     | 10      | 26.9 | 54      | 66   | 4       | 6.5  | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 30 FT           | 9                   | 10   | 8    | 8    | 4             | 8    | 4       | 7.5  | 26.8 | 25.0  | 25.0    | 4    | 13      | 25.0 | 4       | 13   | 18.5             | 4  | 7    | 4     | 9       | 26.9 | 54      | 66   | 4       | 6    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 32 FT           | 9                   | 11   | 8    | 8    | 4             | 7.5  | 4       | 6.5  | 26.9 | 25.0  | 25.0    | 4    | 12      | 25.0 | 4       | 12   | 18.5             | 4  | 8    | 4     | 9       | 27.1 | 55      | 67   | 4       | 6.5  | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 34 FT           | 10                  | 11   | 8    | 8    | 4             | 7.5  | 4       | 6.5  | 27.0 | 26.0  | 26.0    | 4    | 14      | 24.5 | 4       | 14   | 18.5             | 4  | 7.5  | 4     | 8.5     | 27.1 | 55      | 67   | 4       | 6    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 36 FT           | 10                  | 12   | 8    | 8    | 4             | 7.5  | 4       | 6.5  | 27.1 | 26.0  | 26.0    | 4    | 13      | 24.5 | 4       | 13   | 18.5             | 4  | 8    | 4     | 8.5     | 27.4 | 56      | 68   | 4       | 6.5  | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 38 FT           | 10                  | 12   | 8    | 8    | 4             | 7    | 4       | 6    | 27.1 | 26.0  | 26.0    | 4    | 12      | 24.5 | 4       | 12   | 18.5             | 4  | 7.5  | 4     | 8       | 27.4 | 56      | 68   | 4       | 6    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 40 FT           | 11                  | 12   | 8    | 8    | 4             | 7    | 4       | 6    | 27.3 | 27.0  | 27.0    | 4    | 14      | 24.5 | 4       | 14   | 18.5             | 4  | 7    | 4     | 7.5     | 27.5 | 56      | 68   | 4       | 6    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 42 FT           | 11                  | 13   | 8    | 8    | 4             | 7    | 5       | 9    | 27.3 | 27.0  | 27.0    | 4    | 13      | 24.5 | 4       | 13   | 18.5             | 4  | 7.5  | 4     | 7.5     | 27.8 | 57      | 69   | 4       | 6    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 44 FT           | 11                  | 13   | 8    | 8    | 4             | 6.5  | 5       | 8.5  | 27.3 | 27.0  | 27.0    | 4    | 12      | 24.5 | 4       | 12   | 18.5             | 4  | 7    | 4     | 7.5     | 27.6 | 57      | 69   | 4       | 6    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 46 FT           | 11                  | 13   | 8    | 8    | 4             | 6    | 5       | 8.5  | 27.3 | 27.0  | 27.0    | 4    | 12      | 24.5 | 4       | 12   | 18.5             | 4  | 6.5  | 4     | 7       | 27.6 | 57      | 69   | 5       | 9    | 26.0 | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 48 FT           | 12                  | 13   | 8    | 8    | 4             | 6.5  | 5       | 8.5  | 27.4 | 28.0  | 28.0    | 4    | 13      | 24.0 | 4       | 13   | 18.5             | 4  | 6.5  | 4     | 6.5     | 27.8 | 57      | 69   | 5       | 8.5  | 26.0 | 5                          | 12        | 5 | 11.5 | 0  |  |  |  |  |  |  |  |
| 50 FT           | 12                  | 14   | 8    | 8    | 4             | 6    | 5       | 8.5  | 27.5 | 28.0  | 28.0    | 4    | 13      | 23.5 | 4       | 13   | 18.0             | 4  | 7    | 4     | 6.5     | 28.0 | 58      | 70   | 4       | 6    | 25.5 | 5                          | 12        | 5 | 11   | 0  |  |  |  |  |  |  |  |

| SPAN (S) = 4 FT |                     |    |    |    |               |      |         |      |      |       |         |      |         |      |         |      |                  |      |      |    |         |       |         |      |         |      |      |      |           |    |      | HEIGHT (HT) = 6 FT OR 7 FT |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|---------|------|---------|------|------------------|------|------|----|---------|-------|---------|------|---------|------|------|------|-----------|----|------|----------------------------|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |         |      |         |      | BOTTOM SLAB BARS |      |      |    |         |       |         |      |         |      |      |      | WALL BARS |    |      |                            |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |      |      |    | H3 BARS |       | B1 BARS |      | B2 BARS |      |      |      |           |    |      |                            |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA.    | C5   | SIZE    | SPA. | C6               | SIZE | SPA. | C4 | K3      |       | SIZE    | SPA. | C7      | SIZE | SPA. | SIZE | SPA.      | G1 |      |                            |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=6' | HT=7'   |      |         |      |         |      |                  |      |      |    | HT=6'   | HT=7' |         |      |         |      |      |      |           |    |      |                            |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 10                  | 8  | 8  | 8  | 4             | 6.5  | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 24      | 48.0 | 4       | 24   | 20.5             | 4    | 12   | 4  | 8.5     | 46.6  | 76      | 88   | 4       | 8.5  | 28.0 | 5    | 12        | 5  | 12   | 1                          |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 10                  | 8  | 8  | 8  | 4             | 6.5  | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.5             | 4    | 12   | 4  | 8.5     | 45.3  | 76      | 88   | 4       | 8.5  | 27.5 | 5    | 12        | 5  | 12   | 12                         |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 10                  | 8  | 8  | 8  | 4             | 6.5  | 4       | 10.5 | 27.3 | 26.0  | 26.0    | 4    | 23      | 48.0 | 4       | 23   | 20.5             | 4    | 12   | 4  | 7.5     | 45.3  | 76      | 88   | 4       | 8.5  | 27.5 | 5    | 12        | 5  | 12   | 12                         |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 10.5 | 27.3 | 24.0  | 24.0    | 4    | 24      | 48.0 | 4       | 24   | 19.5             | 4    | 12   | 4  | 7.5     | 43.0  | 76      | 88   | 4       | 9    | 27.0 | 5    | 12        | 5  | 12   | 12                         |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 10   | 47.3 | 24.0  | 24.0    | 4    | 24      | 28.5 | 4       | 24   | 19.0             | 4    | 12   | 4  | 7       | 40.8  | 76      | 88   | 4       | 9    | 26.5 | 5    | 12        | 5  | 12   | 12                         |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 9    | 41.4 | 24.0  | 24.0    | 4    | 24      | 27.0 | 4       | 24   | 19.0             | 4    | 12   | 4  | 6.5     | 39.0  | 76      | 88   | 4       | 8.5  | 26.0 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 10   | 35.4 | 24.0  | 24.0    | 4    | 24      | 25.0 | 4       | 24   | 18.5             | 4    | 12   | 4  | 7       | 35.1  | 76      | 88   | 4       | 8.5  | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 8.5  | 34.9 | 24.0  | 24.0    | 4    | 24      | 25.0 | 4       | 24   | 18.5             | 4    | 12   | 4  | 6.5     | 34.9  | 76      | 88   | 4       | 8    | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 7.5  | 34.6 | 24.0  | 24.0    | 4    | 23      | 25.0 | 4       | 23   | 18.5             | 4    | 12   | 4  | 6       | 34.6  | 76      | 88   | 4       | 7.5  | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 6.5  | 34.4 | 24.0  | 24.0    | 4    | 22      | 25.0 | 4       | 22   | 18.5             | 4    | 10.5 | 5  | 6.5     | 34.4  | 76      | 88   | 4       | 7    | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 6    | 34.1 | 24.0  | 24.0    | 4    | 19      | 25.0 | 4       | 19   | 18.5             | 4    | 9.5  | 5  | 6       | 34.3  | 76      | 88   | 4       | 6.5  | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 9  | 9  | 8  | 4             | 11   | 4       | 6.5  | 33.6 | 24.0  | 24.0    | 4    | 18      | 24.5 | 4       | 18   | 18.5             | 4    | 10   | 4  | 6.5     | 34.9  | 77      | 89   | 4       | 7.5  | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                   | 9  | 9  | 8  | 4             | 10   | 4       | 6    | 33.5 | 24.0  | 24.0    | 4    | 16      | 25.0 | 4       | 16   | 18.5             | 4    | 9    | 4  | 6       | 34.8  | 77      | 89   | 4       | 7    | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 8                   | 9  | 9  | 8  | 4             | 9    | 5       | 6.5  | 33.4 | 24.0  | 28.0    | 4    | 15      | 25.0 | 4       | 15   | 18.5             | 4    | 8.5  | 5  | 7       | 34.6  | 77      | 89   | 4       | 6.5  | 25.5 | 5    | 12        | 5  | 12   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 8                   | 10 | 9  | 8  | 4             | 8.5  | 5       | 6    | 33.1 | 24.0  | 24.0    | 4    | 14      | 24.5 | 4       | 14   | 18.5             | 4    | 9    | 4  | 6       | 35.5  | 78      | 90   | 4       | 7    | 26.0 | 5    | 12        | 5  | 11.5 | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 8                   | 10 | 9  | 8  | 4             | 8    | 6       | 7.5  | 36.1 | 24.0  | 28.0    | 4    | 13      | 24.5 | 4       | 13   | 18.5             | 4    | 8.5  | 5  | 7       | 35.5  | 78      | 90   | 4       | 6.5  | 26.0 | 5    | 12        | 5  | 10.5 | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 9                   | 10 | 9  | 8  | 4             | 8    | 5       | 6    | 34.0 | 25.0  | 29.0    | 4    | 14      | 24.5 | 4       | 14   | 18.5             | 4    | 7.5  | 5  | 6.5     | 35.3  | 78      | 90   | 4       | 6    | 25.5 | 5    | 12        | 5  | 10   | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 9                   | 11 | 9  | 8  | 4             | 8    | 5       | 6    | 33.9 | 25.0  | 29.0    | 4    | 13      | 24.5 | 4       | 13   | 18.5             | 4    | 8    | 5  | 6.5     | 35.9  | 79      | 91   | 4       | 6.5  | 26.0 | 5    | 12        | 5  | 9.5  | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 9                   | 11 | 9  | 8  | 4             | 7.5  | 5       | 6    | 33.9 | 25.0  | 29.0    | 4    | 13      | 24.5 | 4       | 13   | 18.5             | 4    | 7.5  | 5  | 6.5     | 35.9  | 79      | 91   | 4       | 6    | 26.0 | 5    | 12        | 5  | 9    | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 10                  | 11 | 9  | 8  | 4             | 7.5  | 5       | 6.5  | 34.6 | 26.0  | 30.0    | 4    | 14      | 24.0 | 4       | 14   | 18.0             | 4    | 7    | 5  | 6       | 35.8  | 79      | 91   | 4       | 6    | 25.5 | 5    | 12        | 5  | 8.5  | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 10                  | 12 | 9  | 8  | 4             | 7    | 5       | 6    | 34.5 | 26.0  | 30.0    | 4    | 14      | 24.0 | 4       | 14   | 18.0             | 4    | 7.5  | 5  | 6       | 36.3  | 80      | 92   | 4       | 6    | 25.5 | 5    | 12        | 5  | 8.5  | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 10                  | 12 | 9  | 8  | 4             | 7    | 5       | 6    | 34.5 | 26.0  | 30.0    | 4    | 13      | 24.0 | 4       | 13   | 18.0             | 4    | 7.5  | 5  | 6       | 36.3  | 80      | 92   | 4       | 6    | 25.5 | 5    | 12        | 5  | 8.5  | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 11                  | 12 | 9  | 8  | 4             | 7    | 5       | 6    | 35.1 | 31.0  | 31.0    | 4    | 14      | 23.5 | 4       | 14   | 18.0             | 4    | 6.5  | 6  | 7.5     | 39.1  | 80      | 92   | 5       | 9    | 25.5 | 5    | 12        | 5  | 8.5  | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 11                  | 13 | 10 | 8  | 4             | 6.5  | 5       | 7    | 35.1 | 27.0  | 31.0    | 4    | 14      | 23.0 | 4       | 14   | 18.0             | 4    | 7.5  | 5  | 7.5     | 36.8  | 81      | 93   | 4       | 6    | 25.5 | 5    | 12        | 5  | 8    | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 11                  | 13 | 10 | 8  | 4             | 6.5  | 5       | 6.5  | 35.0 | 27.0  | 31.0    | 4    | 13      | 23.0 | 4       | 13   | 18.0             | 4    | 7    | 5  | 7       | 36.8  | 81      | 93   | 5       | 9    | 26.0 | 5    | 12        | 5  | 8    | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 11                  | 13 | 10 | 8  | 4             | 6    | 5       | 6    | 35.0 | 27.0  | 31.0    | 4    | 13      | 23.0 | 4       | 13   | 18.0             | 4    | 6.5  | 5  | 6.5     | 36.8  | 81      | 93   | 5       | 8.5  | 25.5 | 5    | 12        | 5  | 8    | 0                          |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 12                  | 14 | 11 | 8  | 4             | 6.5  | 5       | 7    | 35.6 | 28.0  | 32.0    | 4    | 15      | 23.0 | 4       | 15   | 18.0             | 4    | 7    | 5  | 7.5     | 37.3  | 82      | 94   | 5       | 9    | 26.0 | 5    | 12        | 5  | 8    | 0                          |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 4 FEET  
HEIGHT (HT): 6 THRU 7 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
3 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

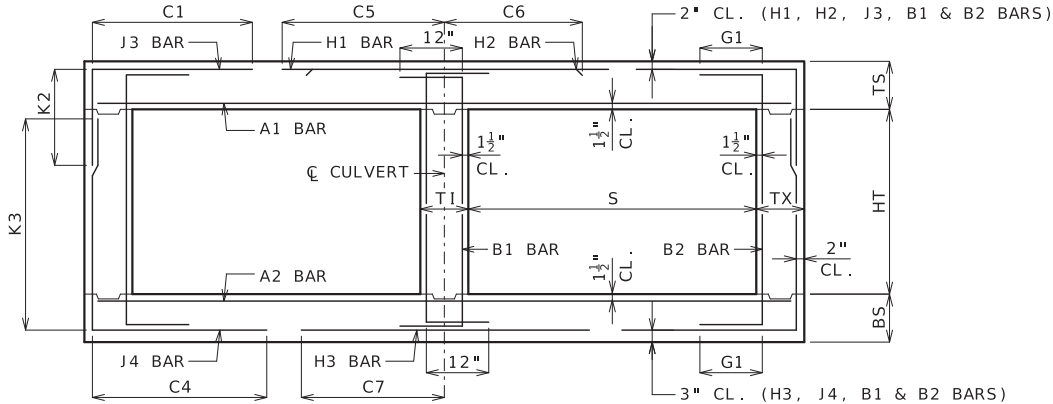


| SPAN (S) = 5 FT |                  |    |    |    |               |      |         |      |      |       |         |      |         |      |         |      |                  |      |      |      |         |      |         |       |         |      |           |      |      |      | HEIGHT (HT) = 3 FT OR 4 FT |    |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|---------|------|---------|------|------------------|------|------|------|---------|------|---------|-------|---------|------|-----------|------|------|------|----------------------------|----|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |         |      |         |      | BOTTOM SLAB BARS |      |      |      |         |      |         |       |         |      | WALL BARS |      |      |      |                            |    |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |      | B1 BARS |       | B2 BARS |      |           |      |      |      |                            |    |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA.    | C5   | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4   | K3      |       | SIZE    | SPA. | C7        | SIZE | SPA. | SIZE | SPA.                       | G1 |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=3' | HT=4'   |      |         |      |         |      |                  |      |      |      |         |      | HT=3'   | HT=4' |         |      |           |      |      |      |                            |    |  |  |  |  |  |  |  |  |
| 1 FT            | 11               | 8  | 8  | 8  | 4             | 6.5  | 4       | 9.5  | 30.9 | 27.0  | 27.0    | 4    | 20      | 56.0 | 4       | 20   | 21.5             | 4    | 12   | 4    | 12      | 33.3 | 40      | 52    | 4       | 7.5  | 31.0      | 5    | 12   | 5    | 12                         | 12 |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 8  | 4             | 6.5  | 4       | 9.5  | 30.9 | 27.0  | 27.0    | 4    | 19      | 56.0 | 4       | 19   | 21.5             | 4    | 11.5 | 4    | 11.5    | 31.0 | 40      | 52    | 4       | 7    | 31.0      | 5    | 12   | 5    | 12                         | 12 |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11               | 8  | 8  | 8  | 4             | 6.5  | 4       | 9.5  | 30.9 | 27.0  | 27.0    | 4    | 18      | 56.0 | 4       | 18   | 21.5             | 4    | 11.5 | 4    | 11.5    | 31.0 | 40      | 52    | 4       | 7    | 31.0      | 5    | 12   | 5    | 12                         | 12 |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 11   | 4       | 12   | 30.0 | 24.0  | 24.0    | 4    | 18      | 39.0 | 4       | 18   | 20.0             | 4    | 12   | 4    | 12      | 28.4 | 40      | 52    | 4       | 7    | 30.0      | 5    | 12   | 5    | 12                         | 12 |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 27.4 | 24.0  | 24.0    | 4    | 19      | 32.0 | 4       | 19   | 20.0             | 4    | 11.5 | 4    | 12      | 26.9 | 40      | 52    | 4       | 7    | 29.5      | 5    | 12   | 5    | 12                         | 12 |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 26.6 | 24.0  | 24.0    | 4    | 18      | 30.5 | 4       | 18   | 19.5             | 4    | 10.5 | 4    | 11.5    | 26.0 | 40      | 52    | 4       | 6.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 8  | 4             | 11   | 4       | 12   | 26.1 | 24.0  | 24.0    | 4    | 16      | 29.5 | 4       | 16   | 19.5             | 4    | 9.5  | 4    | 10.5    | 25.5 | 40      | 52    | 4       | 6    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.6 | 24.0  | 24.0    | 4    | 16      | 28.5 | 4       | 16   | 19.0             | 4    | 9.5  | 4    | 11      | 24.4 | 40      | 52    | 5       | 7.5  | 28.5      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 8  | 8  | 8  | 4             | 10   | 4       | 11   | 24.6 | 24.0  | 24.0    | 4    | 14      | 28.5 | 4       | 14   | 19.0             | 4    | 8.5  | 4    | 10      | 24.3 | 40      | 52    | 5       | 7    | 28.5      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 9  | 8  | 8  | 4             | 9    | 4       | 9.5  | 24.8 | 24.0  | 24.0    | 4    | 12      | 28.5 | 4       | 12   | 19.0             | 4    | 8.5  | 4    | 12      | 23.5 | 41      | 53    | 5       | 7.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                | 9  | 8  | 8  | 4             | 8    | 4       | 8.5  | 24.8 | 24.0  | 24.0    | 5    | 17      | 28.5 | 5       | 17   | 19.5             | 4    | 7.5  | 4    | 11.5    | 23.5 | 41      | 53    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                | 10 | 8  | 8  | 4             | 7.5  | 4       | 7.5  | 24.9 | 24.0  | 24.0    | 5    | 17      | 28.0 | 5       | 17   | 20.0             | 4    | 7.5  | 4    | 12      | 22.9 | 42      | 54    | 5       | 7.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 22 FT           | 9                | 10 | 8  | 8  | 4             | 7    | 4       | 9    | 24.3 | 25.0  | 25.0    | 5    | 16      | 28.5 | 5       | 16   | 19.0             | 4    | 7    | 4    | 12      | 23.1 | 42      | 54    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 24 FT           | 9                | 11 | 8  | 8  | 4             | 6.5  | 4       | 8    | 24.5 | 25.0  | 25.0    | 5    | 16      | 28.5 | 5       | 16   | 20.0             | 4    | 7    | 4    | 10.5    | 22.8 | 43      | 55    | 5       | 7.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 26 FT           | 10               | 11 | 8  | 8  | 4             | 6.5  | 4       | 8.5  | 24.0 | 26.0  | 26.0    | 5    | 16      | 28.5 | 5       | 16   | 19.0             | 4    | 6.5  | 4    | 10.5    | 23.0 | 43      | 55    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 28 FT           | 10               | 12 | 8  | 8  | 4             | 6.5  | 4       | 8    | 24.1 | 26.0  | 26.0    | 5    | 15      | 28.0 | 5       | 15   | 19.5             | 4    | 6.5  | 4    | 9.5     | 22.6 | 44      | 56    | 5       | 7.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 30 FT           | 11               | 12 | 8  | 8  | 4             | 6.5  | 4       | 8.5  | 23.8 | 27.0  | 27.0    | 5    | 15      | 28.0 | 5       | 15   | 19.0             | 4    | 6    | 4    | 9.5     | 22.9 | 44      | 56    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 32 FT           | 11               | 13 | 8  | 8  | 4             | 6    | 4       | 7.5  | 23.9 | 27.0  | 27.0    | 5    | 15      | 28.0 | 5       | 15   | 19.0             | 4    | 6.5  | 4    | 8.5     | 22.8 | 45      | 57    | 5       | 7.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 34 FT           | 12               | 13 | 8  | 8  | 4             | 6    | 4       | 8.5  | 23.6 | 28.0  | 28.0    | 5    | 15      | 28.0 | 5       | 15   | 19.0             | 4    | 6    | 4    | 8.5     | 22.9 | 45      | 57    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 36 FT           | 12               | 14 | 8  | 8  | 5             | 9    | 4       | 7.5  | 23.8 | 28.0  | 28.0    | 5    | 15      | 28.0 | 5       | 15   | 19.0             | 4    | 6    | 4    | 7.5     | 22.8 | 46      | 58    | 5       | 7.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 38 FT           | 13               | 14 | 8  | 8  | 5             | 9    | 4       | 7.5  | 23.5 | 29.0  | 29.0    | 5    | 15      | 27.5 | 5       | 15   | 19.0             | 4    | 6    | 4    | 7.5     | 23.0 | 46      | 58    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 40 FT           | 13               | 15 | 8  | 8  | 5             | 8.5  | 4       | 7.5  | 23.8 | 29.0  | 29.0    | 5    | 15      | 27.5 | 5       | 15   | 19.0             | 4    | 6    | 4    | 7       | 22.9 | 47      | 59    | 5       | 7.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 42 FT           | 13               | 15 | 8  | 8  | 5             | 8    | 4       | 7    | 23.8 | 29.0  | 29.0    | 5    | 14      | 27.5 | 5       | 14   | 19.0             | 5    | 9    | 4    | 7       | 22.9 | 47      | 59    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 44 FT           | 14               | 15 | 8  | 8  | 5             | 8.5  | 4       | 7    | 23.5 | 30.0  | 30.0    | 5    | 15      | 27.0 | 5       | 15   | 19.0             | 5    | 8.5  | 4    | 7       | 23.1 | 47      | 59    | 5       | 6.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 46 FT           | 14               | 16 | 8  | 8  | 5             | 8    | 4       | 7    | 23.6 | 30.0  | 30.0    | 5    | 14      | 27.0 | 5       | 14   | 19.0             | 5    | 9    | 4    | 6.5     | 23.1 | 48      | 60    | 5       | 7    | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 48 FT           | 14               | 16 | 8  | 8  | 5             | 7.5  | 4       | 6.5  | 23.6 | 30.0  | 30.0    | 5    | 14      | 27.0 | 5       | 14   | 19.0             | 5    | 8.5  | 4    | 6.5     | 23.1 | 48      | 60    | 5       | 6.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |
| 50 FT           | 15               | 16 | 8  | 8  | 5             | 7.5  | 4       | 6.5  | 25.6 | 31.0  | 31.0    | 5    | 15      | 31.5 | 5       | 15   | 24.0             | 5    | 8    | 4    | 6.5     | 23.3 | 48      | 60    | 5       | 6.5  | 29.0      | 5    | 12   | 5    | 12                         | 0  |  |  |  |  |  |  |  |  |

| SPAN (S) = 5 FT |                     |      |      |      |               |       |         |      |      |      |         |      |    |         |      |      |                  |    |         |       |      |      |         |      |         |      |         | HEIGHT (HT) = 5 FT OR 6 FT |           |   |      |    |  |  |  |  |  |  |  |
|-----------------|---------------------|------|------|------|---------------|-------|---------|------|------|------|---------|------|----|---------|------|------|------------------|----|---------|-------|------|------|---------|------|---------|------|---------|----------------------------|-----------|---|------|----|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |       |         |      |      |      |         |      |    |         |      |      | BOTTOM SLAB BARS |    |         |       |      |      |         |      |         |      |         |                            | WALL BARS |   |      |    |  |  |  |  |  |  |  |
|                 |                     |      |      |      | A1 BARS       |       | J3 BARS |      |      |      | H1 BARS |      |    | H2 BARS |      |      | A2 BARS          |    | J4 BARS |       |      |      | H3 BARS |      | B1 BARS |      | B2 BARS |                            |           |   |      |    |  |  |  |  |  |  |  |
|                 | SIZE                | SPA. | SIZE | SPA. | C1            | K2    |         | SIZE | SPA. | C5   | SIZE    | SPA. | C6 | SIZE    | SPA. | SIZE | SPA.             | C4 | K3      |       | SIZE | SPA. | C7      | SIZE | SPA.    | SIZE | SPA.    | G1                         |           |   |      |    |  |  |  |  |  |  |  |
|                 |                     |      |      |      |               | HT=5' | HT=6'   |      |      |      |         |      |    |         |      |      |                  |    | HT=5'   | HT=6' |      |      |         |      |         |      |         |                            |           |   |      |    |  |  |  |  |  |  |  |
| 1 FT            | 11                  | 8    | 8    | 8    | 4             | 6     | 4       | 9.5  | 30.9 | 27.0 | 27.0    | 4    | 20 | 56.0    | 4    | 20   | 22.0             | 4  | 11.5    | 4     | 9.5  | 44.1 | 64      | 76   | 4       | 7    | 31.0    | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 2 FT            | 11                  | 8    | 8    | 8    | 4             | 6     | 4       | 9.5  | 30.9 | 27.0 | 27.0    | 4    | 19 | 56.0    | 4    | 19   | 21.5             | 4  | 10.5    | 4     | 9    | 40.6 | 64      | 76   | 4       | 7    | 31.0    | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 2' - 4'         | 11                  | 8    | 8    | 8    | 4             | 6     | 4       | 9.5  | 30.9 | 27.0 | 27.0    | 4    | 18 | 56.0    | 4    | 18   | 21.5             | 4  | 10.5    | 4     | 9    | 40.6 | 64      | 76   | 4       | 7    | 31.0    | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8    | 8    | 8    | 4             | 10.5  | 4       | 10.5 | 30.9 | 24.0 | 24.0    | 4    | 18 | 56.0    | 4    | 18   | 20.0             | 4  | 11.5    | 4     | 9    | 37.6 | 64      | 76   | 4       | 7    | 30.0    | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 10.5 | 37.1 | 24.0 | 24.0    | 4    | 19 | 32.0    | 4    | 19   | 20.0             | 4  | 11      | 4     | 8.5  | 34.6 | 64      | 76   | 4       | 6.5  | 29.5    | 5                          | 12        | 5 | 12   | 12 |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 10   | 33.8 | 24.0 | 24.0    | 4    | 18 | 30.5    | 4    | 18   | 19.5             | 4  | 10      | 4     | 8    | 33.0 | 64      | 76   | 4       | 6    | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8    | 8    | 8    | 4             | 11    | 4       | 9    | 32.3 | 24.0 | 24.0    | 4    | 16 | 29.5    | 4    | 16   | 19.5             | 4  | 9       | 4     | 7.5  | 31.9 | 64      | 76   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8    | 8    | 8    | 4             | 11.5  | 4       | 9.5  | 29.5 | 24.0 | 24.0    | 4    | 16 | 28.5    | 4    | 16   | 19.0             | 4  | 9       | 4     | 7.5  | 29.4 | 64      | 76   | 5       | 7.5  | 28.5    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8    | 8    | 8    | 4             | 10    | 4       | 8    | 29.3 | 24.0 | 24.0    | 4    | 14 | 28.5    | 4    | 14   | 19.0             | 4  | 8       | 4     | 7    | 29.1 | 64      | 76   | 5       | 7    | 28.5    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 9    | 8    | 8    | 4             | 9     | 4       | 7    | 29.3 | 24.0 | 24.0    | 4    | 12 | 28.0    | 4    | 12   | 19.0             | 4  | 8       | 4     | 8    | 29.3 | 65      | 77   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 9    | 8    | 8    | 4             | 8     | 4       | 6.5  | 29.1 | 24.0 | 24.0    | 5    | 17 | 28.0    | 5    | 17   | 19.5             | 4  | 7       | 4     | 7.5  | 29.1 | 65      | 77   | 5       | 7    | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 10   | 8    | 8    | 4             | 7     | 5       | 7    | 29.0 | 24.0 | 24.0    | 5    | 17 | 28.0    | 5    | 17   | 20.0             | 4  | 7.5     | 4     | 8.5  | 29.3 | 66      | 78   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 22 FT           | 9                   | 10   | 8    | 8    | 4             | 7     | 4       | 6.5  | 29.1 | 25.0 | 25.0    | 5    | 16 | 28.0    | 5    | 16   | 19.0             | 4  | 7       | 4     | 7.5  | 29.3 | 66      | 78   | 5       | 7    | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 24 FT           | 9                   | 11   | 8    | 8    | 4             | 6.5   | 4       | 6    | 29.1 | 25.0 | 25.0    | 5    | 16 | 28.0    | 5    | 16   | 19.5             | 4  | 7       | 4     | 7.5  | 29.5 | 67      | 79   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 26 FT           | 10                  | 11   | 8    | 8    | 4             | 6.5   | 5       | 8    | 29.3 | 26.0 | 26.0    | 5    | 16 | 28.0    | 5    | 16   | 19.0             | 4  | 6.5     | 4     | 6.5  | 29.5 | 67      | 79   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 28 FT           | 10                  | 12   | 8    | 8    | 4             | 6.5   | 5       | 7.5  | 29.3 | 26.0 | 26.0    | 5    | 15 | 28.0    | 5    | 15   | 19.0             | 4  | 6.5     | 4     | 6.5  | 29.6 | 68      | 80   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 30 FT           | 11                  | 12   | 8    | 8    | 4             | 6.5   | 5       | 8.5  | 29.4 | 27.0 | 27.0    | 5    | 16 | 27.5    | 5    | 16   | 19.0             | 4  | 6.5     | 4     | 6    | 29.8 | 68      | 80   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 32 FT           | 11                  | 13   | 8    | 8    | 4             | 6     | 5       | 8    | 29.5 | 27.0 | 27.0    | 5    | 15 | 27.5    | 5    | 15   | 19.0             | 4  | 6.5     | 4     | 6    | 29.9 | 69      | 81   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 12   | 0  |  |  |  |  |  |  |  |
| 34 FT           | 12                  | 13   | 8    | 8    | 4             | 6     | 5       | 8.5  | 29.5 | 28.0 | 32.0    | 5    | 16 | 27.5    | 5    | 16   | 19.0             | 4  | 6       | 5     | 8.5  | 30.0 | 69      | 81   | 5       | 7    | 29.0    | 5                          | 12        | 5 | 11.5 | 0  |  |  |  |  |  |  |  |
| 36 FT           | 12                  | 14   | 8    | 8    | 5             | 9     | 5       | 7.5  | 29.6 | 28.0 | 32.0    | 5    | 15 | 27.0    | 5    | 15   | 19.0             | 4  | 6.5     | 5     | 9    | 30.1 | 70      | 82   | 5       | 7.5  | 29.0    | 5                          | 12        | 5 | 10.5 | 0  |  |  |  |  |  |  |  |
| 38 FT           | 12                  | 14   | 8    | 8    | 5             | 8.5   | 5       | 7.5  | 29.6 | 28.0 | 32.0    | 5    | 15 | 27.0    | 5    | 15   | 19.0             | 4  | 6       | 5     | 8.5  | 30.1 | 70      | 82   | 5       | 7    | 29.0    | 5                          | 12        | 5 | 10   | 0  |  |  |  |  |  |  |  |
| 40 FT           | 13                  | 14   | 8    | 8    | 5             | 8.5   | 5       | 7.5  | 29.6 | 29.0 | 33.0    | 5    | 16 | 27.0    | 5    | 16   | 19.0             | 5  | 8.5     | 5     | 8    | 30.3 | 70      | 82   | 5       | 7    | 29.0    | 5                          | 12        | 5 | 9.5  | 0  |  |  |  |  |  |  |  |
| 42 FT           | 13                  | 15   | 8    | 8    | 5             | 8.5   | 5       | 7    | 29.8 | 29.0 | 33.0    | 5    | 15 | 26.5    | 5    | 15   | 19.0             | 4  | 6       | 5     | 8    | 30.4 | 71      | 83   | 5       | 7    | 28.5    | 5                          | 12        | 5 | 9.5  | 0  |  |  |  |  |  |  |  |
| 44 FT           | 13                  | 15   | 8    | 8    | 5             | 8     | 5       | 6.5  | 29.8 | 29.0 | 33.0    | 5    | 14 | 26.5    | 5    | 14   | 19.0             | 5  | 9       | 5     | 8    | 30.4 | 71      | 83   | 5       | 7    | 28.5    | 5                          | 12        | 5 | 9.5  | 0  |  |  |  |  |  |  |  |
| 46 FT           | 14                  | 16   | 9    | 8    | 5             | 8     | 5       | 8    | 30.5 | 30.0 | 34.0    | 5    | 16 | 26.0    | 5    | 16   | 19.0             | 5  | 9       | 5     | 9    | 31.0 | 72      | 84   | 5       | 7    | 29.0    | 5                          | 12        | 5 | 9.5  | 0  |  |  |  |  |  |  |  |
| 48 FT           | 14                  | 16   | 9    | 8    | 5             | 8     | 5       | 8    | 30.4 | 30.0 | 34.0    | 5    | 15 | 26.0    | 5    | 15   | 19.0             | 5  | 8.5     | 5     | 8.5  | 31.0 | 72      | 84   | 5       | 6.5  | 29.0    | 5                          | 12        | 5 | 9    | 0  |  |  |  |  |  |  |  |
| 50 FT           | 14                  | 16   | 10   | 8    | 5             | 7.5   | 5       | 7.5  | 31.0 | 30.0 | 30.0    | 5    | 15 | 26.0    | 5    | 15   | 19.0             | 5  | 8       | 4     | 6    | 31.1 | 72      | 84   | 5       | 6.5  | 29.0    | 5                          | 12        | 5 | 10   | 0  |  |  |  |  |  |  |  |

| SPAN (S) = 5 FT |                     |    |    |    |               |      |         |      |      |       |         |      |      |      |         |      |                  |      |         |    |         |       |      |      |         |      |      |      |           |    | HEIGHT (HT) = 7 FT OR 8 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|------|---------|------|------------------|------|---------|----|---------|-------|------|------|---------|------|------|------|-----------|----|----------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |      |         |      | BOTTOM SLAB BARS |      |         |    |         |       |      |      |         |      |      |      | WALL BARS |    |                            |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      |      | H2 BARS |      |                  |      | A2 BARS |    | J4 BARS |       |      |      | H3 BARS |      |      |      | B1 BARS   |    | B2 BARS                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5   | SIZE    | SPA. | C6               | SIZE | SPA.    | C4 | K3      |       | SIZE | SPA. | C7      | SIZE | SPA. | SIZE | SPA.      | G1 |                            |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=7' | HT=8'   |      |      |      |         |      |                  |      |         |    | HT=7'   | HT=8' |      |      |         |      |      |      |           |    |                            |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 11                  | 8  | 8  | 8  | 4             | 6    | 4       | 9.5  | 30.9 | 27.0  | 27.0    | 4    | 20   | 56.0 | 4       | 20   | 22.0             | 4    | 10.5    | 4  | 7       | 52.1  | 88   | 100  | 4       | 7    | 31.0 | 5    | 12        | 5  | 12                         | 1  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11                  | 8  | 8  | 8  | 4             | 6    | 4       | 9    | 30.9 | 27.0  | 27.0    | 4    | 20   | 56.0 | 4       | 20   | 22.0             | 4    | 10      | 4  | 6.5     | 50.0  | 88   | 100  | 4       | 6.5  | 31.0 | 5    | 12        | 5  | 12                         | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11                  | 8  | 8  | 8  | 4             | 6    | 4       | 7    | 30.9 | 27.0  | 27.0    | 4    | 18   | 56.0 | 4       | 18   | 22.0             | 4    | 10      | 4  | 6       | 50.0  | 88   | 100  | 4       | 6.5  | 31.0 | 5    | 12        | 5  | 12                         | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 8  | 4             | 10   | 4       | 7    | 30.9 | 24.0  | 24.0    | 4    | 18   | 56.0 | 4       | 18   | 20.5             | 4    | 10.5    | 4  | 6       | 47.4  | 88   | 100  | 4       | 6.5  | 30.0 | 5    | 12        | 5  | 12                         | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 9  | 8  | 8  | 4             | 12   | 4       | 7    | 51.6 | 24.0  | 24.0    | 4    | 19   | 32.5 | 4       | 19   | 20.0             | 4    | 12      | 4  | 6.5     | 46.3  | 89   | 101  | 4       | 7.5  | 29.5 | 5    | 12        | 5  | 12                         | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 9  | 8  | 8  | 4             | 12   | 4       | 6.5  | 44.5 | 24.0  | 24.0    | 4    | 18   | 30.5 | 4       | 18   | 19.5             | 4    | 11      | 4  | 6       | 44.0  | 89   | 101  | 4       | 7    | 29.5 | 5    | 12        | 5  | 12                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 9  | 9  | 8  | 4             | 11.5 | 4       | 7    | 40.8 | 24.0  | 24.0    | 4    | 16   | 29.5 | 4       | 16   | 19.5             | 4    | 10      | 4  | 6.5     | 41.4  | 89   | 101  | 4       | 6.5  | 29.0 | 5    | 12        | 5  | 12                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 9  | 9  | 8  | 4             | 12   | 4       | 7    | 36.9 | 24.0  | 24.0    | 4    | 17   | 28.0 | 4       | 17   | 19.0             | 4    | 10.5    | 4  | 7       | 38.3  | 89   | 101  | 4       | 6.5  | 29.0 | 5    | 12        | 5  | 12                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 9  | 9  | 8  | 4             | 10.5 | 4       | 6.5  | 36.4 | 24.0  | 24.0    | 4    | 15   | 28.0 | 4       | 15   | 19.0             | 4    | 9       | 4  | 6.5     | 37.9  | 89   | 101  | 4       | 6    | 29.0 | 5    | 12        | 5  | 12                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 9  | 9  | 8  | 4             | 9    | 5       | 7    | 36.0 | 24.0  | 28.0    | 4    | 13   | 28.0 | 4       | 13   | 19.0             | 4    | 8       | 5  | 7       | 37.5  | 89   | 101  | 5       | 7.5  | 28.5 | 5    | 12        | 5  | 12                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 9  | 9  | 8  | 4             | 8    | 5       | 6    | 35.8 | 24.0  | 28.0    | 5    | 18   | 28.0 | 5       | 18   | 19.0             | 4    | 7.5     | 5  | 6       | 37.3  | 89   | 101  | 5       | 7    | 28.5 | 5    | 12        | 5  | 12                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 10 | 9  | 8  | 4             | 7.5  | 6       | 7    | 38.4 | 24.0  | 28.0    | 5    | 17   | 28.0 | 5       | 17   | 19.5             | 4    | 7.5     | 5  | 6.5     | 38.1  | 90   | 102  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 11                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 9                   | 10 | 9  | 8  | 4             | 7.5  | 5       | 6    | 36.4 | 25.0  | 29.0    | 5    | 17   | 27.5 | 5       | 17   | 19.0             | 4    | 7       | 5  | 6       | 37.8  | 90   | 102  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 10                         | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 9                   | 11 | 9  | 8  | 4             | 7    | 5       | 6    | 36.1 | 25.0  | 29.0    | 5    | 16   | 27.5 | 5       | 16   | 19.0             | 4    | 7       | 5  | 6       | 38.5  | 91   | 103  | 5       | 8    | 29.0 | 5    | 12        | 5  | 9.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 10                  | 11 | 9  | 8  | 4             | 7    | 5       | 6    | 36.9 | 26.0  | 30.0    | 5    | 17   | 27.5 | 5       | 17   | 19.0             | 4    | 6.5     | 5  | 6       | 38.3  | 91   | 103  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 9                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 10                  | 12 | 9  | 8  | 4             | 6.5  | 5       | 6    | 36.8 | 30.0  | 30.0    | 5    | 16   | 27.5 | 5       | 16   | 19.0             | 4    | 7       | 5  | 6       | 38.9  | 92   | 104  | 5       | 8    | 29.0 | 5    | 12        | 5  | 8.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 11                  | 12 | 9  | 8  | 4             | 6.5  | 5       | 6    | 37.4 | 31.0  | 31.0    | 5    | 17   | 27.0 | 5       | 17   | 19.0             | 4    | 6.5     | 6  | 7.5     | 41.6  | 92   | 104  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 8.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 11                  | 13 | 9  | 8  | 4             | 6.5  | 6       | 7    | 40.3 | 31.0  | 31.0    | 5    | 16   | 27.0 | 5       | 16   | 19.0             | 4    | 6.5     | 5  | 6       | 39.1  | 93   | 105  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 8.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 11                  | 13 | 9  | 8  | 4             | 6    | 6       | 7    | 40.1 | 31.0  | 35.0    | 5    | 15   | 27.0 | 5       | 15   | 19.0             | 4    | 6.5     | 6  | 7       | 42.1  | 93   | 105  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 8.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 12                  | 14 | 10 | 8  | 4             | 6    | 5       | 6.5  | 37.8 | 32.0  | 32.0    | 5    | 17   | 26.0 | 5       | 17   | 19.0             | 4    | 6.5     | 5  | 7       | 39.5  | 94   | 106  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 8                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 12                  | 14 | 10 | 8  | 5             | 9    | 5       | 6    | 37.6 | 32.0  | 32.0    | 5    | 16   | 26.0 | 5       | 16   | 19.0             | 4    | 6       | 5  | 6.5     | 39.5  | 94   | 106  | 5       | 7    | 29.0 | 5    | 12        | 5  | 8                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 12                  | 15 | 11 | 8  | 5             | 8.5  | 5       | 7    | 37.8 | 28.0  | 32.0    | 5    | 15   | 26.0 | 5       | 15   | 19.0             | 4    | 6       | 5  | 7       | 40.0  | 95   | 107  | 5       | 7.5  | 29.0 | 5    | 12        | 5  | 7.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 13                  | 15 | 11 | 8  | 5             | 8.5  | 5       | 7    | 38.3 | 33.0  | 33.0    | 5    | 17   | 25.5 | 5       | 17   | 18.5             | 4    | 6       | 5  | 7       | 39.9  | 95   | 107  | 5       | 7    | 29.0 | 5    | 12        | 5  | 7.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 13                  | 15 | 11 | 8  | 5             | 8.5  | 5       | 6.5  | 38.1 | 33.0  | 33.0    | 5    | 16   | 25.5 | 5       | 16   | 18.5             | 5    | 9       | 5  | 7       | 39.9  | 95   | 107  | 5       | 6.5  | 29.0 | 5    | 12        | 5  | 7.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 13                  | 16 | 12 | 8  | 5             | 8    | 5       | 6.5  | 38.3 | 29.0  | 33.0    | 5    | 16   | 25.5 | 5       | 16   | 18.5             | 4    | 6       | 5  | 7       | 40.4  | 96   | 108  | 5       | 7    | 29.0 | 5    | 12        | 5  | 7.5                        | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 14                  | 16 | 12 | 8  | 5             | 8    | 5       | 6.5  | 38.8 | 34.0  | 34.0    | 5    | 17   | 25.0 | 5       | 17   | 18.5             | 5    | 9       | 5  | 6.5     | 40.4  | 96   | 108  | 5       | 6.5  | 29.0 | 5    | 12        | 5  | 7                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 14                  | 16 | 12 | 8  | 5             | 7.5  | 5       | 6.5  | 38.8 | 34.0  | 34.0    | 5    | 17   | 25.0 | 5       | 17   | 18.5             | 5    | 8.5     | 5  | 6.5     | 40.3  | 96   | 108  | 5       | 6.5  | 29.0 | 5    | 12        | 5  | 7                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 5 FEET  
HEIGHT (HT): 7 THRU 8 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
5 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

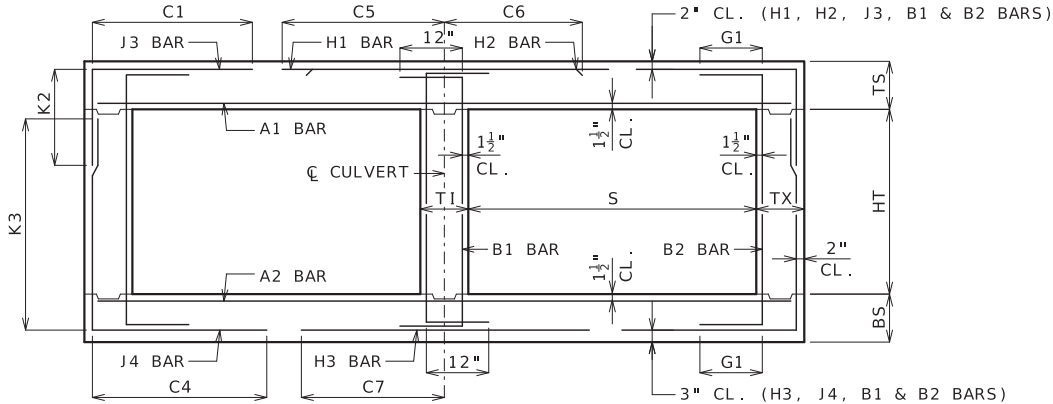
| SPAN (S) = 6 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |      |         |                  |      |         |      |         |      |      |       |       |       |         |      |           |         |      | HEIGHT (HT) = 3 FT OR 4 FT OR 5 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------|---------|------------------|------|---------|------|---------|------|------|-------|-------|-------|---------|------|-----------|---------|------|------------------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |      |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |       |         |      | WALL BARS |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |      | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |       | H3 BARS |      |           | B1 BARS |      | B2 BARS                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5   | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |       | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE                               | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=3' | HT=4' | HT=5' |         |      |      |         |                  |      |         |      |         |      |      | HT=3' | HT=4' | HT=5' |         |      |           |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 11               | 8  | 8  | 8  | 5             | 8.5  | 4       | 9.5  | 34.5 | 27.0  | 27.0  | 27.0  | 4       | 16   | 64.5 | 4       | 16               | 23.0 | 4       | 9.5  | 4       | 9.5  | 37.6 | 40    | 52    | 64    | 4       | 6    | 34.5      | 5       | 12   | 5                                  | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 8  | 5             | 8.5  | 4       | 9.5  | 34.5 | 27.0  | 27.0  | 27.0  | 4       | 15   | 64.5 | 4       | 15               | 22.5 | 4       | 9    | 4       | 9    | 35.0 | 40    | 52    | 64    | 5       | 7.5  | 34.0      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11               | 8  | 8  | 8  | 5             | 8.5  | 4       | 9    | 34.5 | 27.0  | 27.0  | 27.0  | 4       | 13   | 64.5 | 4       | 13               | 22.5 | 4       | 9    | 4       | 9    | 35.0 | 40    | 52    | 64    | 5       | 7.5  | 34.0      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 8    | 4       | 9    | 34.0 | 24.0  | 24.0  | 24.0  | 4       | 13   | 43.5 | 4       | 13               | 21.0 | 4       | 9    | 4       | 9.5  | 32.0 | 40    | 52    | 64    | 5       | 7.5  | 33.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 9.5  | 4       | 9.5  | 30.4 | 24.0  | 24.0  | 24.0  | 4       | 13   | 35.5 | 4       | 13               | 20.5 | 4       | 8.5  | 4       | 9    | 29.9 | 40    | 52    | 64    | 5       | 7    | 32.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 9    | 4       | 9    | 29.3 | 24.0  | 24.0  | 24.0  | 4       | 12   | 34.0 | 4       | 12               | 20.5 | 4       | 7.5  | 4       | 8    | 28.9 | 40    | 52    | 64    | 5       | 6.5  | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 9  | 8  | 8  | 4             | 8    | 4       | 8    | 28.8 | 24.0  | 24.0  | 24.0  | 5       | 17   | 33.0 | 5       | 17               | 20.5 | 4       | 7.5  | 4       | 10   | 27.8 | 41    | 53    | 65    | 5       | 7    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 9  | 8  | 8  | 4             | 7    | 4       | 7    | 28.4 | 24.0  | 24.0  | 24.0  | 5       | 16   | 32.5 | 5       | 16               | 21.5 | 4       | 6.5  | 4       | 9    | 27.3 | 41    | 53    | 65    | 5       | 6.5  | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 9  | 8  | 8  | 4             | 7.5  | 4       | 7    | 27.0 | 24.0  | 24.0  | 24.0  | 5       | 16   | 31.5 | 5       | 16               | 21.5 | 4       | 6.6  | 4       | 9.5  | 25.9 | 41    | 53    | 65    | 5       | 6    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 10 | 8  | 8  | 4             | 6.5  | 4       | 6    | 27.1 | 24.0  | 24.0  | 24.0  | 5       | 15   | 31.5 | 5       | 15               | 22.5 | 4       | 6.5  | 4       | 11.5 | 25.3 | 42    | 54    | 66    | 5       | 6.5  | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 9                | 11 | 8  | 8  | 4             | 6.5  | 4       | 7.5  | 26.6 | 25.0  | 25.0  | 25.0  | 5       | 16   | 31.5 | 5       | 16               | 21.5 | 4       | 6.5  | 4       | 10.5 | 25.0 | 43    | 55    | 67    | 5       | 7    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 10               | 11 | 8  | 8  | 4             | 6    | 4       | 7.5  | 26.1 | 26.0  | 26.0  | 26.0  | 5       | 15   | 31.5 | 5       | 15               | 21.0 | 4       | 6    | 4       | 10   | 25.3 | 43    | 55    | 67    | 5       | 6.5  | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 10               | 12 | 8  | 8  | 5             | 9    | 4       | 6.5  | 26.3 | 26.0  | 26.0  | 26.0  | 5       | 15   | 31.5 | 5       | 15               | 21.5 | 4       | 6    | 4       | 9.5  | 24.9 | 44    | 56    | 68    | 5       | 6.5  | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 11               | 12 | 8  | 8  | 5             | 9    | 4       | 7    | 25.9 | 27.0  | 27.0  | 27.0  | 5       | 14   | 31.5 | 5       | 14               | 21.0 | 5       | 8.5  | 4       | 9    | 25.1 | 44    | 56    | 68    | 5       | 6    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 11               | 13 | 8  | 8  | 5             | 8.5  | 4       | 6    | 26.0 | 27.0  | 27.0  | 27.0  | 5       | 14   | 31.5 | 5       | 14               | 21.5 | 5       | 8.5  | 4       | 8.5  | 24.9 | 45    | 57    | 69    | 5       | 6    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 12               | 14 | 8  | 8  | 5             | 8.5  | 4       | 6.5  | 25.9 | 28.0  | 28.0  | 28.0  | 5       | 13   | 31.5 | 5       | 13               | 20.5 | 5       | 9    | 4       | 7.5  | 25.0 | 46    | 58    | 70    | 5       | 6.5  | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 13               | 14 | 8  | 8  | 5             | 8.5  | 4       | 6.5  | 25.6 | 29.0  | 29.0  | 29.0  | 5       | 12   | 31.0 | 5       | 12               | 20.0 | 5       | 8.5  | 4       | 7.5  | 25.1 | 46    | 58    | 70    | 5       | 6    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 13               | 15 | 8  | 8  | 5             | 8    | 4       | 6    | 25.8 | 29.0  | 29.0  | 29.0  | 5       | 12   | 31.0 | 5       | 12               | 20.5 | 5       | 8.5  | 4       | 7    | 25.1 | 47    | 59    | 71    | 5       | 6    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 14               | 15 | 8  | 8  | 5             | 8    | 4       | 6    | 25.5 | 30.0  | 30.0  | 30.0  | 5       | 12   | 31.0 | 5       | 12               | 20.0 | 5       | 8    | 4       | 7    | 25.3 | 47    | 59    | 71    | 6       | 8.5  | 35.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 14               | 16 | 8  | 8  | 5             | 7.5  | 5       | 8.5  | 25.8 | 30.0  | 30.0  | 30.0  | 5       | 12   | 31.0 | 5       | 12               | 20.0 | 5       | 8    | 4       | 6.5  | 25.3 | 48    | 60    | 72    | 5       | 6    | 32.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 15               | 16 | 8  | 8  | 5             | 7.5  | 4       | 6    | 27.5 | 31.0  | 31.0  | 31.0  | 5       | 12   | 35.5 | 5       | 12               | 25.0 | 5       | 7.5  | 4       | 6.5  | 25.4 | 48    | 60    | 72    | 6       | 8    | 35.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 15               | 17 | 8  | 8  | 5             | 7    | 5       | 8    | 30.8 | 31.0  | 31.0  | 31.0  | 6       | 17   | 39.5 | 6       | 17               | 29.0 | 5       | 7.5  | 4       | 6    | 25.4 | 49    | 61    | 73    | 6       | 8.5  | 35.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 16               | 17 | 8  | 8  | 5             | 7    | 5       | 7    | 30.6 | 32.0  | 32.0  | 32.0  | 5       | 12   | 35.0 | 5       | 12               | 25.0 | 5       | 7.5  | 4       | 6    | 25.6 | 49    | 61    | 73    | 6       | 8    | 35.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 16               | 18 | 8  | 8  | 5             | 6.5  | 5       | 7    | 30.8 | 32.0  | 32.0  | 36.0  | 6       | 17   | 39.0 | 6       | 17               | 29.0 | 5       | 7.5  | 5       | 6.5  | 25.6 | 50    | 62    | 74    | 6       | 8    | 35.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 16               | 18 | 8  | 8  | 5             | 6    | 5       | 7    | 30.8 | 32.0  | 32.0  | 36.0  | 6       | 16   | 39.0 | 6       | 16               | 29.0 | 5       | 7    | 5       | 6.5  | 25.6 | 50    | 62    | 74    | 6       | 8    | 35.0      | 5       | 12   | 5                                  | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 17               | 19 | 8  | 8  | 5             | 6.5  | 5       | 6.5  | 30.8 | 37.0  | 37.0  | 37.0  | 5       | 12   | 34.5 | 5       | 12               | 24.5 | 5       | 7.5  | 5       | 6.5  | 25.9 | 51    | 63    | 75    | 6       | 8    | 35.0      | 5       | 12   | 5                                  | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 17               | 19 | 8  | 8  | 5             | 6    | 5       | 6.5  | 30.8 | 37.0  | 37.0  | 37.0  | 6       | 16   | 38.5 | 6       | 16               | 28.5 | 5       | 7    | 5       | 6.5  | 25.9 | 51    | 63    | 75    | 6       | 7.5  | 35.0      | 5       | 12   | 5                                  | 10   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 6 FT |                  |    |    |    |               |      |         |      |      |                    |         |      |         |      |         |      |                  |      |      |      |         |      |                    |    |         |      |      | HEIGHT (HT) = 6 FT OR 7 FT |           |      |      |    |    |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|--------------------|---------|------|---------|------|---------|------|------------------|------|------|------|---------|------|--------------------|----|---------|------|------|----------------------------|-----------|------|------|----|----|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                    |         |      |         |      |         |      | BOTTOM SLAB BARS |      |      |      |         |      |                    |    |         |      |      |                            | WALL BARS |      |      |    |    |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                    | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |      | B1 BARS            |    | B2 BARS |      |      |                            |           |      |      |    |    |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=6', HT=7' |         | SIZE | SPA.    | C5   | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4   | K3<br>HT=6', HT=7' |    | SIZE    | SPA. | C7   | SIZE                       | SPA.      | SIZE | SPA. | G1 |    |  |  |  |  |  |  |
|                 | 1 FT             | 11 | 8  | 8  | 8             | 5    | 8       | 4    | 9.5  | 34.5               | 27.0    | 27.0 | 4       | 16   | 64.5    | 4    | 16               | 23.5 | 4    | 9    | 4       | 7.5  | 48.9               | 76 | 88      | 5    | 7.5  | 34.5                       | 5         | 12   | 5    | 12 | 12 |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 8  | 5             | 8    | 4       | 9.5  | 34.5 | 27.0               | 27.0    | 4    | 15      | 64.5 | 4       | 15   | 23.0             | 4    | 8.5  | 4    | 7.5     | 45.0 | 76                 | 88 | 5       | 7.5  | 34.0 | 5                          | 12        | 5    | 12   | 12 |    |  |  |  |  |  |  |
| 2' - 4'         | 11               | 8  | 8  | 8  | 5             | 8    | 4       | 7.5  | 34.5 | 27.0               | 27.0    | 4    | 13      | 64.5 | 4       | 13   | 23.0             | 4    | 8.5  | 4    | 7       | 45.0 | 76                 | 88 | 5       | 7    | 34.0 | 5                          | 12        | 5    | 12   | 12 |    |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 7.5  | 4       | 7.5  | 34.5 | 24.0               | 24.0    | 4    | 13      | 64.5 | 4       | 13   | 21.0             | 4    | 8.5  | 4    | 7       | 41.6 | 76                 | 88 | 5       | 7    | 33.5 | 5                          | 12        | 5    | 12   | 12 |    |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 9    | 4       | 7.5  | 40.9 | 24.0               | 24.0    | 4    | 13      | 36.0 | 4       | 13   | 20.5             | 4    | 8    | 4    | 6.5     | 38.1 | 76                 | 88 | 5       | 7    | 32.5 | 5                          | 12        | 5    | 12   | 12 |    |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 9    | 4       | 7    | 37.0 | 24.0               | 24.0    | 4    | 12      | 34.0 | 4       | 12   | 20.5             | 4    | 7.5  | 4    | 6       | 36.3 | 76                 | 88 | 5       | 6.5  | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 10 FT           | 8                | 9  | 8  | 8  | 4             | 8    | 4       | 6    | 35.1 | 24.0               | 24.0    | 5    | 17      | 33.0 | 5       | 17   | 21.0             | 4    | 7.5  | 4    | 6.5     | 35.5 | 77                 | 89 | 5       | 7    | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 12 FT           | 8                | 9  | 8  | 8  | 4             | 7    | 5       | 6.5  | 34.1 | 24.0               | 24.0    | 5    | 16      | 32.5 | 5       | 16   | 21.5             | 4    | 6.5  | 4    | 6       | 34.5 | 77                 | 89 | 5       | 6.5  | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 14 FT           | 8                | 9  | 8  | 8  | 4             | 7    | 5       | 6.5  | 31.8 | 24.0               | 24.0    | 5    | 16      | 31.5 | 5       | 16   | 21.5             | 4    | 6.5  | 4    | 6       | 32.0 | 77                 | 89 | 5       | 6    | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 16 FT           | 8                | 10 | 8  | 8  | 4             | 6.5  | 5       | 6    | 31.6 | 24.0               | 24.0    | 5    | 15      | 31.0 | 5       | 15   | 22.5             | 4    | 6.5  | 4    | 7       | 32.0 | 78                 | 90 | 5       | 6.5  | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 18 FT           | 9                | 11 | 8  | 8  | 4             | 6.5  | 5       | 6.5  | 31.8 | 25.0               | 25.0    | 5    | 16      | 31.0 | 5       | 16   | 21.5             | 4    | 6.5  | 4    | 6.5     | 32.3 | 79                 | 91 | 5       | 7    | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 20 FT           | 10               | 11 | 8  | 8  | 4             | 6    | 5       | 7.5  | 31.8 | 26.0               | 30.0    | 5    | 15      | 31.0 | 5       | 15   | 21.0             | 4    | 6    | 5    | 7.5     | 32.1 | 79                 | 91 | 5       | 6.5  | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 22 FT           | 10               | 12 | 8  | 8  | 5             | 9    | 5       | 7    | 31.6 | 26.0               | 30.0    | 5    | 15      | 31.0 | 5       | 15   | 21.5             | 4    | 6    | 5    | 8       | 32.3 | 80                 | 92 | 5       | 6.5  | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 24 FT           | 11               | 12 | 8  | 8  | 5             | 9    | 5       | 7.5  | 31.8 | 27.0               | 31.0    | 5    | 14      | 31.0 | 5       | 14   | 20.5             | 5    | 8.5  | 5    | 7.5     | 32.1 | 80                 | 92 | 5       | 6    | 32.0 | 5                          | 12        | 5    | 12   | 0  |    |  |  |  |  |  |  |
| 26 FT           | 11               | 13 | 8  | 8  | 5             | 8.5  | 5       | 6.5  | 31.8 | 27.0               | 31.0    | 5    | 14      | 31.0 | 5       | 14   | 21.0             | 5    | 9    | 5    | 7.5     | 32.3 | 81                 | 93 | 5       | 6    | 32.0 | 5                          | 12        | 5    | 11   | 0  |    |  |  |  |  |  |  |
| 28 FT           | 12               | 14 | 8  | 8  | 5             | 8.5  | 5       | 7    | 31.9 | 28.0               | 32.0    | 5    | 13      | 30.5 | 5       | 13   | 20.0             | 5    | 9    | 5    | 8       | 32.6 | 82                 | 94 | 5       | 6.5  | 32.0 | 5                          | 12        | 5    | 10   | 0  |    |  |  |  |  |  |  |
| 30 FT           | 12               | 14 | 8  | 8  | 5             | 7.5  | 5       | 6.5  | 31.8 | 28.0               | 32.0    | 5    | 13      | 30.5 | 5       | 13   | 20.5             | 5    | 8.5  | 5    | 7.5     | 32.5 | 82                 | 94 | 5       | 6    | 32.0 | 5                          | 12        | 5    | 9.5  | 0  |    |  |  |  |  |  |  |
| 32 FT           | 13               | 15 | 8  | 8  | 5             | 8    | 5       | 6.5  | 32.0 | 29.0               | 33.0    | 5    | 12      | 30.0 | 5       | 12   | 20.0             | 5    | 8.5  | 5    | 7.5     | 32.8 | 83                 | 95 | 5       | 6    | 32.0 | 5                          | 12        | 5    | 9.5  | 0  |    |  |  |  |  |  |  |
| 34 FT           | 13               | 15 | 8  | 8  | 5             | 7    | 5       | 6    | 31.9 | 29.0               | 33.0    | 5    | 12      | 30.0 | 5       | 12   | 20.0             | 5    | 8    | 5    | 7       | 32.8 | 83                 | 95 | 5       | 6    | 32.0 | 5                          | 12        | 5    | 9.5  | 0  |    |  |  |  |  |  |  |
| 36 FT           | 14               | 16 | 9  | 8  | 5             | 7.5  | 5       | 7.5  | 32.6 | 30.0               | 34.0    | 5    | 12      | 29.5 | 5       | 12   | 19.5             | 5    | 8    | 5    | 8       | 33.3 | 84                 | 96 | 5       | 6    | 32.0 | 5                          | 12        | 5    | 9    | 0  |    |  |  |  |  |  |  |
| 38 FT           | 14               | 16 | 9  | 8  | 5             | 7    | 5       | 7    | 32.5 | 30.0               | 34.0    | 5    | 12      | 29.5 | 5       | 12   | 19.5             | 5    | 8    | 5    | 8       | 33.1 | 84                 | 96 | 6       | 8    | 35.0 | 5                          | 12        | 5    | 8.5  | 0  |    |  |  |  |  |  |  |
| 40 FT           | 15               | 17 | 9  | 8  | 5             | 7    | 5       | 6.5  | 37.8 | 31.0               | 35.0    | 5    | 13      | 34.0 | 5       | 13   | 24.5             | 5    | 8    | 5    | 8       | 33.5 | 85                 | 97 | 6       | 8.5  | 35.0 | 5                          | 12        | 5    | 8.5  | 0  |    |  |  |  |  |  |  |
| 42 FT           | 15               | 17 | 10 | 8  | 5             | 7    | 5       | 7.5  | 38.3 | 31.0               | 35.0    | 5    | 12      | 34.0 | 5       | 12   | 24.5             | 5    | 7.5  | 5    | 7.5     | 33.6 | 85                 | 97 | 6       | 8    | 35.0 | 5                          | 12        | 5    | 9    | 0  |    |  |  |  |  |  |  |
| 44 FT           | 15               | 18 | 10 | 8  | 5             | 6    | 5       | 7    | 38.4 | 31.0               | 35.0    | 5    | 12      | 34.0 | 5       | 12   | 24.5             | 5    | 7.5  | 5    | 7.5     | 33.9 | 86                 | 98 | 6       | 8    | 35.0 | 5                          | 12        | 5    | 8.5  | 0  |    |  |  |  |  |  |  |
| 46 FT           | 16               | 18 | 10 | 8  | 5             | 6.5  | 5       | 6.5  | 38.4 | 32.0               | 36.0    | 5    | 12      | 33.0 | 5       | 12   | 24.5             | 5    | 7.5  | 5    | 7.5     | 34.0 | 86                 | 98 | 6       | 7.5  | 35.0 | 5                          | 12        | 5    | 8    | 0  |    |  |  |  |  |  |  |
| 48 FT           | 16               | 19 | 11 | 8  | 5             | 6.5  | 5       | 7    | 39.0 | 32.0               | 36.0    | 5    | 12      | 33.0 | 5       | 12   | 24.5             | 5    | 7.5  | 5    | 8.5     | 34.4 | 87                 | 99 | 6       | 8    | 35.0 | 5                          | 12        | 5    | 8.5  | 0  |    |  |  |  |  |  |  |
| 50 FT           | 17               | 19 | 11 | 8  | 5             | 6.5  | 5       | 7    | 39.1 | 33.0               | 37.0    | 5    | 13      | 32.5 | 5       | 13   | 24.5             | 5    | 7    | 5    | 8       | 34.5 | 87                 | 99 | 6       | 7.5  | 35.0 | 5                          | 12        | 5    | 8    | 0  |    |  |  |  |  |  |  |



| SPAN (S) = 6 FT |                     |    |    |    |               |      |         |      |      |       |         |      |      |         |      |      |                  |      |         |      |      |      |         |       |      |         |      |         |           | HEIGHT (HT) = 8 FT OR 9 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|---------|------|------|------------------|------|---------|------|------|------|---------|-------|------|---------|------|---------|-----------|----------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |         |      |      | BOTTOM SLAB BARS |      |         |      |      |      |         |       |      |         |      |         | WALL BARS |                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      | H2 BARS |      |      | A2 BARS          |      | J4 BARS |      |      |      | H3 BARS |       |      | B1 BARS |      | B2 BARS |           |                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5      | SIZE | SPA. | C6               | SIZE | SPA.    | SIZE | SPA. | C4   | K3      |       | SIZE | SPA.    | C7   | SIZE    | SPA.      | SIZE                       | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=8' | HT=9'   |      |      |         |      |      |                  |      |         |      |      |      | HT=8'   | HT=9' |      |         |      |         |           |                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 11                  | 9  | 8  | 8  | 5             | 8    | 4       | 7    | 34.5 | 27.0  | 27.0    | 4    | 16   | 64.5    | 4    | 16   | 23.5             | 4    | 9.5     | 4    | 6.5  | 59.4 | 101     | 113   | 4    | 6.5     | 34.5 | 5       | 12        | 5                          | 12   | 1  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11                  | 9  | 8  | 8  | 5             | 8    | 4       | 6.5  | 34.5 | 27.0  | 27.0    | 4    | 16   | 64.5    | 4    | 16   | 23.0             | 4    | 9       | 4    | 6    | 57.0 | 101     | 113   | 4    | 6       | 34.0 | 5       | 12        | 5                          | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 11                  | 9  | 9  | 8  | 5             | 8    | 4       | 6.5  | 35.1 | 27.0  | 27.0    | 4    | 13   | 65.0    | 4    | 13   | 23.0             | 4    | 9       | 4    | 6    | 57.0 | 101     | 113   | 4    | 6       | 34.0 | 5       | 12        | 5                          | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 9  | 9  | 8  | 4             | 7.5  | 4       | 6.5  | 35.1 | 24.0  | 24.0    | 4    | 13   | 65.0    | 4    | 13   | 21.0             | 4    | 9.5     | 4    | 6.5  | 53.0 | 101     | 113   | 4    | 6       | 33.5 | 5       | 12        | 5                          | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 9  | 9  | 8  | 4             | 9    | 4       | 6    | 53.1 | 24.0  | 24.0    | 4    | 13   | 36.0    | 4    | 13   | 20.5             | 4    | 9       | 4    | 6    | 49.5 | 101     | 113   | 4    | 6       | 33.0 | 5       | 12        | 5                          | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 9  | 9  | 8  | 4             | 9    | 5       | 7    | 46.5 | 24.0  | 28.0    | 4    | 12   | 33.5    | 4    | 12   | 20.5             | 4    | 8       | 5    | 6.5  | 46.5 | 101     | 113   | 5    | 7.5     | 32.5 | 5       | 12        | 5                          | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 9  | 9  | 8  | 4             | 8    | 5       | 6    | 43.8 | 24.0  | 28.0    | 5    | 17   | 32.5    | 5    | 17   | 20.5             | 4    | 7.5     | 5    | 6    | 44.6 | 101     | 113   | 5    | 6.5     | 32.0 | 5       | 12        | 5                          | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 9  | 10 | 8  | 4             | 7.5  | 5       | 6.5  | 41.8 | 24.0  | 28.0    | 5    | 17   | 32.0    | 5    | 17   | 21.5             | 4    | 6.5     | 5    | 6.5  | 42.9 | 101     | 113   | 5    | 6.5     | 32.0 | 5       | 12        | 5                          | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 9  | 10 | 8  | 4             | 7.5  | 5       | 6.5  | 38.5 | 24.0  | 28.0    | 5    | 17   | 31.0    | 5    | 17   | 21.0             | 4    | 6.5     | 5    | 6.5  | 39.6 | 101     | 113   | 5    | 6       | 31.5 | 5       | 12        | 5                          | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 10 | 10 | 8  | 4             | 6.5  | 5       | 6    | 38.1 | 24.0  | 28.0    | 5    | 16   | 31.0    | 5    | 16   | 22.0             | 4    | 6.5     | 5    | 7    | 40.6 | 102     | 114   | 5    | 6.5     | 32.0 | 5       | 12        | 5                          | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 9                   | 11 | 10 | 8  | 4             | 6.5  | 5       | 6    | 38.8 | 25.0  | 29.0    | 5    | 16   | 31.0    | 5    | 16   | 21.0             | 4    | 6.5     | 5    | 7    | 41.1 | 103     | 115   | 5    | 7       | 32.0 | 5       | 12        | 5                          | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 9                   | 11 | 10 | 8  | 4             | 6    | 5       | 6    | 38.5 | 25.0  | 29.0    | 5    | 16   | 31.0    | 5    | 16   | 22.0             | 4    | 6       | 5    | 6.5  | 40.9 | 103     | 115   | 5    | 6       | 32.0 | 5       | 12        | 5                          | 10   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 10                  | 12 | 10 | 8  | 4             | 6    | 5       | 6.5  | 39.1 | 30.0  | 30.0    | 5    | 15   | 30.5    | 5    | 15   | 21.0             | 4    | 6       | 5    | 6.5  | 41.4 | 104     | 116   | 5    | 6.5     | 32.0 | 5       | 12        | 5                          | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 11                  | 13 | 10 | 8  | 4             | 6    | 5       | 6.5  | 39.6 | 31.0  | 31.0    | 5    | 14   | 30.5    | 5    | 14   | 20.0             | 4    | 6       | 5    | 6.5  | 41.8 | 105     | 117   | 5    | 6.5     | 32.0 | 5       | 12        | 5                          | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 11                  | 13 | 10 | 8  | 5             | 9    | 5       | 6    | 39.4 | 31.0  | 31.0    | 5    | 14   | 30.5    | 5    | 14   | 20.5             | 5    | 9       | 5    | 6.5  | 41.6 | 105     | 117   | 5    | 6       | 32.0 | 5       | 12        | 5                          | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 12                  | 14 | 10 | 8  | 5             | 9    | 5       | 6    | 40.0 | 32.0  | 32.0    | 5    | 13   | 30.0    | 5    | 13   | 19.5             | 4    | 6       | 5    | 6.5  | 42.0 | 106     | 118   | 5    | 6.5     | 32.0 | 5       | 12        | 5                          | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 12                  | 14 | 10 | 8  | 5             | 8    | 5       | 6    | 39.9 | 32.0  | 32.0    | 5    | 13   | 30.0    | 5    | 13   | 20.0             | 5    | 8.5     | 5    | 6    | 41.9 | 106     | 118   | 5    | 6       | 32.0 | 5       | 12        | 5                          | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 13                  | 15 | 11 | 8  | 5             | 8.5  | 5       | 7    | 40.4 | 33.0  | 33.0    | 5    | 13   | 29.0    | 5    | 13   | 19.5             | 5    | 8.5     | 5    | 7    | 42.3 | 107     | 119   | 5    | 6       | 32.0 | 5       | 12        | 5                          | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 13                  | 15 | 11 | 8  | 5             | 8    | 5       | 6.5  | 40.3 | 33.0  | 33.0    | 5    | 13   | 29.0    | 5    | 13   | 19.5             | 5    | 8       | 5    | 7    | 42.1 | 107     | 119   | 6    | 8       | 35.0 | 5       | 12        | 5                          | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 14                  | 16 | 11 | 8  | 5             | 8    | 5       | 6    | 40.8 | 34.0  | 34.0    | 5    | 14   | 28.5    | 5    | 14   | 19.5             | 5    | 8.5     | 5    | 7    | 42.6 | 108     | 120   | 5    | 6       | 32.0 | 5       | 12        | 5                          | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 14                  | 16 | 12 | 8  | 5             | 7.5  | 5       | 6.5  | 40.8 | 34.0  | 34.0    | 5    | 13   | 28.5    | 5    | 13   | 19.5             | 5    | 7.5     | 5    | 6.5  | 42.5 | 108     | 120   | 6    | 8       | 35.0 | 5       | 12        | 5                          | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 14                  | 17 | 12 | 8  | 5             | 7    | 5       | 6    | 40.8 | 34.0  | 34.0    | 5    | 12   | 28.5    | 5    | 12   | 19.5             | 5    | 8       | 5    | 6.5  | 43.0 | 109     | 121   | 6    | 8       | 35.0 | 5       | 12        | 5                          | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 15                  | 17 | 13 | 8  | 5             | 7    | 5       | 6    | 46.4 | 35.0  | 35.0    | 5    | 13   | 33.0    | 5    | 13   | 24.5             | 5    | 7       | 5    | 6    | 42.8 | 109     | 121   | 6    | 7.5     | 35.0 | 5       | 12        | 5                          | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 15                  | 18 | 13 | 8  | 5             | 7    | 5       | 6    | 46.4 | 35.0  | 35.0    | 5    | 13   | 33.0    | 5    | 13   | 24.5             | 5    | 7.5     | 5    | 6    | 43.3 | 110     | 122   | 6    | 8       | 35.0 | 5       | 12        | 5                          | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 15                  | 18 | 13 | 8  | 5             | 6    | 5       | 6    | 46.3 | 35.0  | 35.0    | 5    | 12   | 33.0    | 5    | 12   | 24.5             | 5    | 7.5     | 5    | 6    | 43.3 | 110     | 122   | 6    | 7.5     | 35.0 | 5       | 12        | 5                          | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 16                  | 19 | 14 | 8  | 5             | 6.5  | 5       | 6    | 47.0 | 36.0  | 36.0    | 5    | 14   | 32.5    | 5    | 14   | 24.0             | 5    | 7.5     | 5    | 6    | 43.8 | 111     | 123   | 6    | 7.5     | 35.0 | 5       | 12        | 5                          | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 16                  | 19 | 14 | 8  | 5             | 6    | 5       | 6    | 46.9 | 36.0  | 36.0    | 5    | 13   | 32.5    | 5    | 13   | 24.0             | 5    | 7       | 5    | 6    | 43.6 | 111     | 123   | 6    | 7.5     | 35.0 | 5       | 12        | 5                          | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 6 FEET  
HEIGHT (HT): 8 THRU 9 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
7 OF 27

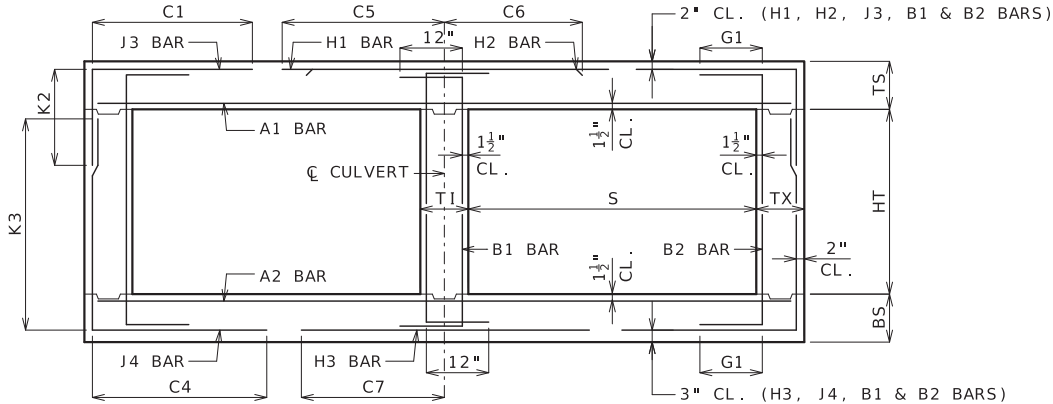
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| SPAN (S) = 7 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |      |         |                  |      |         |      |         |      |      |       |       |       |         |      |           |         |      | HEIGHT (HT) = 4 FT OR 5 FT OR 6 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------|---------|------------------|------|---------|------|---------|------|------|-------|-------|-------|---------|------|-----------|---------|------|------------------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |      |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |       |         |      | WALL BARS |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |      | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |       | H3 BARS |      |           | B1 BARS |      | B2 BARS                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5   | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |       | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE                               | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=4' | HT=5' | HT=6' |         |      |      |         |                  |      |         |      |         |      |      | HT=4' | HT=5' | HT=6' |         |      |           |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 12               | 8  | 8  | 8  | 5             | 8    | 4       | 8.5  | 38.1 | 28.0  | 28.0  | 28.0  | 4       | 15   | 73.0 | 4       | 15               | 25.5 | 4       | 7    | 4       | 6.5  | 41.8 | 52    | 64    | 76    | 5       | 6.5  | 37.5      | 5       | 12   | 5                                  | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 12               | 9  | 8  | 8  | 5             | 7.5  | 4       | 8.5  | 38.1 | 28.0  | 28.0  | 28.0  | 4       | 14   | 73.0 | 4       | 14               | 24.5 | 4       | 7.5  | 4       | 8.5  | 39.9 | 53    | 65    | 77    | 5       | 7    | 37.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 12               | 9  | 8  | 8  | 5             | 7.5  | 4       | 6.5  | 38.4 | 28.0  | 28.0  | 28.0  | 5       | 17   | 73.0 | 5       | 17               | 24.5 | 4       | 7    | 4       | 7    | 39.9 | 53    | 65    | 77    | 5       | 6    | 37.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 6    | 4       | 6.5  | 38.4 | 24.0  | 24.0  | 24.0  | 5       | 17   | 48.0 | 5       | 17               | 23.5 | 4       | 7    | 4       | 7    | 35.8 | 52    | 64    | 76    | 5       | 6    | 36.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 7    | 4       | 7    | 33.9 | 24.0  | 24.0  | 24.0  | 5       | 17   | 39.0 | 5       | 17               | 23.5 | 4       | 6.5  | 4       | 6.5  | 33.3 | 52    | 64    | 76    | 6       | 7    | 38.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 9  | 8  | 8  | 4             | 7    | 4       | 6.5  | 32.1 | 24.0  | 24.0  | 24.0  | 5       | 16   | 37.0 | 5       | 16               | 24.0 | 4       | 6.5  | 4       | 8    | 31.8 | 53    | 65    | 77    | 5       | 6    | 35.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 10 | 8  | 8  | 4             | 6    | 5       | 7    | 31.5 | 24.0  | 24.0  | 24.0  | 5       | 15   | 36.0 | 5       | 15               | 24.0 | 4       | 6.5  | 4       | 9.5  | 30.5 | 54    | 66    | 78    | 5       | 6.5  | 35.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 9                | 10 | 8  | 8  | 4             | 6    | 4       | 6.5  | 30.5 | 25.0  | 25.0  | 25.0  | 5       | 15   | 35.5 | 5       | 15               | 24.0 | 5       | 9    | 4       | 8.5  | 29.8 | 54    | 66    | 78    | 5       | 6    | 35.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 9                | 11 | 8  | 8  | 5             | 8.5  | 5       | 7    | 30.4 | 25.0  | 25.0  | 25.0  | 5       | 14   | 35.5 | 5       | 14               | 24.0 | 5       | 9    | 4       | 8.5  | 29.1 | 55    | 67    | 79    | 5       | 6    | 35.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 10               | 11 | 8  | 8  | 4             | 6    | 4       | 6.5  | 28.5 | 26.0  | 26.0  | 26.0  | 5       | 15   | 34.5 | 5       | 15               | 23.0 | 5       | 8.5  | 4       | 8    | 27.8 | 55    | 67    | 79    | 5       | 6    | 35.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 10               | 12 | 8  | 8  | 5             | 8    | 5       | 8    | 28.6 | 26.0  | 26.0  | 26.0  | 5       | 14   | 34.5 | 5       | 14               | 23.5 | 5       | 8.5  | 4       | 8.5  | 27.4 | 56    | 68    | 80    | 5       | 6    | 35.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 11               | 12 | 8  | 8  | 5             | 8    | 5       | 9    | 28.1 | 27.0  | 27.0  | 27.0  | 5       | 14   | 34.5 | 5       | 14               | 23.5 | 5       | 7    | 4       | 7    | 27.5 | 56    | 68    | 80    | 6       | 7    | 38.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 12               | 13 | 8  | 8  | 5             | 8    | 5       | 8.5  | 27.9 | 28.0  | 28.0  | 28.0  | 5       | 13   | 34.5 | 5       | 13               | 23.0 | 5       | 7.5  | 4       | 7    | 27.5 | 57    | 69    | 81    | 6       | 7.5  | 38.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 12               | 14 | 8  | 8  | 5             | 7.5  | 5       | 8.5  | 28.0 | 28.0  | 28.0  | 28.0  | 5       | 13   | 34.5 | 5       | 13               | 23.5 | 5       | 7.5  | 4       | 7    | 27.3 | 58    | 70    | 82    | 6       | 7.5  | 38.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 13               | 15 | 8  | 8  | 5             | 7    | 5       | 8.5  | 27.9 | 29.0  | 29.0  | 29.0  | 5       | 12   | 34.5 | 5       | 12               | 22.5 | 5       | 7.5  | 4       | 7    | 27.4 | 59    | 71    | 83    | 6       | 7.5  | 38.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 14               | 15 | 8  | 8  | 5             | 7    | 5       | 8.5  | 27.6 | 30.0  | 30.0  | 30.0  | 5       | 12   | 34.0 | 5       | 12               | 22.0 | 5       | 7    | 4       | 6.5  | 27.6 | 59    | 71    | 83    | 6       | 7    | 38.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 14               | 16 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 27.8 | 30.0  | 30.0  | 30.0  | 5       | 12   | 34.0 | 5       | 12               | 22.5 | 5       | 7    | 4       | 6.5  | 27.5 | 60    | 72    | 84    | 6       | 7    | 38.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 15               | 17 | 8  | 8  | 5             | 6.5  | 5       | 8    | 32.8 | 31.0  | 31.0  | 31.0  | 6       | 16   | 43.0 | 6       | 16               | 30.5 | 5       | 7.5  | 4       | 6    | 27.8 | 61    | 73    | 85    | 6       | 7.5  | 38.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 16               | 17 | 8  | 8  | 5             | 6.5  | 5       | 7    | 32.6 | 32.0  | 32.0  | 32.0  | 6       | 15   | 42.5 | 6       | 15               | 29.5 | 5       | 7    | 4       | 6    | 27.9 | 61    | 73    | 85    | 6       | 7    | 38.0      | 5       | 12   | 5                                  | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 16               | 18 | 8  | 8  | 5             | 6    | 5       | 7    | 32.8 | 32.0  | 36.0  | 36.0  | 6       | 15   | 42.5 | 6       | 15               | 30.0 | 5       | 7    | 5       | 6.5  | 27.9 | 62    | 74    | 86    | 6       | 7    | 38.0      | 5       | 12   | 5                                  | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 17               | 18 | 8  | 8  | 5             | 6    | 5       | 6.5  | 32.8 | 37.0  | 37.0  | 37.0  | 6       | 14   | 42.0 | 6       | 14               | 29.5 | 5       | 6    | 5       | 6.5  | 28.0 | 62    | 74    | 86    | 6       | 6.5  | 38.0      | 5       | 12   | 5                                  | 10   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 17               | 19 | 8  | 8  | 5             | 6    | 5       | 6.5  | 32.8 | 37.0  | 37.0  | 37.0  | 6       | 14   | 42.0 | 6       | 14               | 30.0 | 5       | 6.5  | 5       | 6.5  | 28.0 | 63    | 75    | 87    | 6       | 7    | 38.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 18               | 20 | 8  | 8  | 5             | 6    | 5       | 6.5  | 32.9 | 38.0  | 38.0  | 38.0  | 6       | 14   | 41.5 | 6       | 14               | 29.5 | 5       | 6.5  | 5       | 6    | 28.3 | 64    | 76    | 88    | 6       | 7    | 38.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 18               | 20 | 8  | 8  | 6             | 8    | 5       | 6.5  | 32.9 | 38.0  | 38.0  | 38.0  | 6       | 14   | 41.5 | 6       | 14               | 29.5 | 5       | 6.5  | 5       | 6    | 28.3 | 64    | 76    | 88    | 6       | 6.5  | 38.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 19               | 21 | 8  | 8  | 6             | 8    | 5       | 6    | 33.0 | 39.0  | 39.0  | 39.0  | 6       | 14   | 41.0 | 6       | 14               | 29.5 | 5       | 6.5  | 6       | 7.5  | 31.5 | 65    | 77    | 89    | 6       | 6.5  | 38.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 19               | 21 | 8  | 8  | 6             | 8    | 5       | 6    | 32.9 | 39.0  | 39.0  | 39.0  | 6       | 14   | 41.0 | 6       | 14               | 29.5 | 5       | 6    | 6       | 7.5  | 31.4 | 65    | 77    | 89    | 6       | 6.5  | 38.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 20               | 22 | 9  | 8  | 6             | 8    | 5       | 6.5  | 33.8 | 40.0  | 40.0  | 40.0  | 6       | 15   | 40.0 | 6       | 15               | 29.0 | 5       | 6    | 5       | 6    | 29.0 | 66    | 78    | 90    | 6       | 6.5  | 38.0      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 7 FT |                     |      |      |      |               |     |         |       |       |      |         |      |         |      |         |      |                  |    |     |       |         |      |         |      |         |      | HEIGHT (HT) = 7 FT OR 8 FT |    |    |   |      |    |  |  |  |  |  |  |
|-----------------|---------------------|------|------|------|---------------|-----|---------|-------|-------|------|---------|------|---------|------|---------|------|------------------|----|-----|-------|---------|------|---------|------|---------|------|----------------------------|----|----|---|------|----|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |     |         |       |       |      |         |      |         |      |         |      | BOTTOM SLAB BARS |    |     |       |         |      |         |      |         |      | WALL BARS                  |    |    |   |      |    |  |  |  |  |  |  |
|                 |                     |      |      |      | A1 BARS       |     | J3 BARS |       |       |      | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |    |     |       | H3 BARS |      | B1 BARS |      | B2 BARS |      |                            |    |    |   |      |    |  |  |  |  |  |  |
|                 | SIZE                | SPA. | SIZE | SPA. | C1            | K2  |         | SIZE  | SPA.  | C5   | SIZE    | SPA. | C6      | SIZE | SPA.    | SIZE | SPA.             | C4 | K3  |       | SIZE    | SPA. | C7      | SIZE | SPA.    | SIZE | SPA.                       | G1 |    |   |      |    |  |  |  |  |  |  |
|                 | TS                  | BS   | TX   | TI   |               |     |         | HT=7' | HT=8' |      |         |      |         |      |         |      |                  |    |     | HT=7' | HT=8'   |      |         |      |         |      |                            |    |    |   |      |    |  |  |  |  |  |  |
| 1 FT            | 12                  | 9    | 8    | 8    | 5             | 7.5 | 4       | 8.5   | 38.1  | 28.0 | 28.0    | 4    | 15      | 73.0 | 4       | 15   | 25.5             | 4  | 7.5 | 4     | 7       | 56.0 | 89      | 101  | 5       | 7    | 37.5                       | 5  | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 2 FT            | 12                  | 9    | 8    | 8    | 5             | 7.5 | 4       | 8     | 38.1  | 28.0 | 28.0    | 4    | 15      | 73.0 | 4       | 15   | 25.0             | 4  | 7   | 4     | 6.5     | 51.4 | 89      | 101  | 5       | 7    | 37.5                       | 5  | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 2' - 4'         | 12                  | 9    | 8    | 8    | 5             | 7.5 | 5       | 6.5   | 40.1  | 28.0 | 28.0    | 5    | 17      | 75.0 | 5       | 17   | 25.0             | 4  | 7   | 4     | 6.5     | 51.4 | 89      | 101  | 5       | 7    | 37.5                       | 5  | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 4 FT            | 8                   | 9    | 8    | 8    | 4             | 6   | 5       | 6.5   | 40.1  | 24.0 | 24.0    | 5    | 17      | 75.0 | 5       | 17   | 23.5             | 4  | 7.5 | 4     | 6.5     | 47.8 | 89      | 101  | 5       | 7    | 37.0                       | 5  | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 6 FT            | 8                   | 9    | 8    | 8    | 4             | 7   | 5       | 6.5   | 44.6  | 24.0 | 24.0    | 5    | 17      | 39.5 | 5       | 17   | 23.5             | 4  | 7   | 4     | 6       | 43.5 | 89      | 101  | 5       | 6.5  | 36.0                       | 5  | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 8 FT            | 8                   | 9    | 9    | 8    | 4             | 7   | 4       | 6     | 40.1  | 24.0 | 24.0    | 5    | 16      | 37.0 | 5       | 16   | 23.5             | 4  | 6.5 | 4     | 6.5     | 40.4 | 89      | 101  | 5       | 6    | 35.5                       | 5  | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 10 FT           | 8                   | 10   | 9    | 8    | 4             | 6.5 | 5       | 6     | 38.4  | 24.0 | 24.0    | 5    | 15      | 36.0 | 5       | 15   | 24.0             | 4  | 6.5 | 4     | 7       | 39.5 | 90      | 102  | 5       | 6.5  | 35.5                       | 5  | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 12 FT           | 9                   | 10   | 9    | 8    | 4             | 6   | 5       | 6.5   | 37.8  | 25.0 | 25.0    | 5    | 15      | 35.5 | 5       | 15   | 24.0             | 5  | 9   | 4     | 6       | 38.1 | 90      | 102  | 5       | 6    | 35.0                       | 5  | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 14 FT           | 9                   | 11   | 9    | 8    | 5             | 8.5 | 5       | 6     | 37.1  | 25.0 | 25.0    | 5    | 14      | 35.0 | 5       | 14   | 23.5             | 5  | 9   | 4     | 6       | 37.9 | 91      | 103  | 5       | 6    | 35.5                       | 5  | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 16 FT           | 9                   | 11   | 9    | 8    | 5             | 8.5 | 5       | 6     | 34.8  | 25.0 | 25.0    | 5    | 14      | 34.0 | 5       | 14   | 23.5             | 5  | 8.5 | 4     | 6       | 35.3 | 91      | 103  | 5       | 6    | 35.0                       | 5  | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 18 FT           | 10                  | 12   | 9    | 8    | 5             | 8.5 | 5       | 7     | 34.9  | 26.0 | 30.0    | 5    | 14      | 34.0 | 5       | 14   | 23.5             | 5  | 8.5 | 5     | 8.5     | 35.3 | 92      | 104  | 5       | 6    | 35.0                       | 5  | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 20 FT           | 11                  | 13   | 9    | 8    | 5             | 8   | 5       | 7.5   | 34.9  | 27.0 | 31.0    | 5    | 14      | 34.0 | 5       | 14   | 23.0             | 5  | 8.5 | 5     | 8       | 35.4 | 93      | 105  | 6       | 8    | 38.0                       | 5  | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 22 FT           | 11                  | 13   | 9    | 8    | 5             | 7   | 5       | 6.5   | 34.8  | 27.0 | 31.0    | 5    | 13      | 34.0 | 5       | 13   | 23.5             | 5  | 7.5 | 5     | 8       | 35.1 | 93      | 105  | 6       | 7.5  | 38.0                       | 5  | 12 | 5 | 11.5 | 0  |  |  |  |  |  |  |
| 24 FT           | 12                  | 14   | 9    | 8    | 5             | 7.5 | 5       | 7     | 34.8  | 28.0 | 32.0    | 5    | 13      | 34.0 | 5       | 13   | 23.0             | 5  | 8   | 5     | 8       | 35.4 | 94      | 106  | 6       | 7.5  | 38.0                       | 5  | 12 | 5 | 10.5 | 0  |  |  |  |  |  |  |
| 26 FT           | 13                  | 15   | 9    | 8    | 5             | 7.5 | 5       | 7     | 34.9  | 29.0 | 33.0    | 5    | 12      | 33.5 | 5       | 12   | 22.0             | 5  | 8   | 5     | 8       | 35.6 | 95      | 107  | 6       | 7.5  | 38.0                       | 5  | 12 | 5 | 9.5  | 0  |  |  |  |  |  |  |
| 28 FT           | 13                  | 15   | 9    | 8    | 5             | 6.5 | 5       | 6.5   | 34.8  | 33.0 | 33.0    | 5    | 12      | 33.5 | 5       | 12   | 22.5             | 5  | 7   | 5     | 7.5     | 35.4 | 95      | 107  | 6       | 7    | 38.0                       | 5  | 12 | 5 | 9    | 0  |  |  |  |  |  |  |
| 30 FT           | 14                  | 16   | 9    | 8    | 5             | 7   | 5       | 6.5   | 34.9  | 34.0 | 34.0    | 5    | 12      | 33.0 | 5       | 12   | 21.5             | 5  | 7.5 | 5     | 7.5     | 35.6 | 96      | 108  | 6       | 7    | 38.0                       | 5  | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |
| 32 FT           | 15                  | 17   | 9    | 8    | 5             | 7   | 5       | 6     | 40.0  | 35.0 | 35.0    | 6    | 16      | 41.5 | 6       | 16   | 29.5             | 5  | 7.5 | 5     | 7.5     | 36.0 | 97      | 109  | 6       | 7.5  | 38.0                       | 5  | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |
| 34 FT           | 15                  | 17   | 10   | 8    | 5             | 6.5 | 5       | 7     | 40.5  | 35.0 | 35.0    | 6    | 16      | 41.5 | 6       | 16   | 30.0             | 5  | 6.5 | 5     | 7.5     | 36.0 | 97      | 109  | 6       | 7    | 38.0                       | 5  | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |
| 36 FT           | 16                  | 18   | 10   | 8    | 5             | 6.5 | 5       | 6.5   | 40.6  | 36.0 | 36.0    | 6    | 15      | 41.0 | 6       | 15   | 29.5             | 5  | 7   | 5     | 7.5     | 36.4 | 98      | 110  | 6       | 7    | 38.0                       | 5  | 12 | 5 | 8    | 0  |  |  |  |  |  |  |
| 38 FT           | 16                  | 19   | 11   | 8    | 5             | 6   | 5       | 7     | 41.3  | 32.0 | 36.0    | 6    | 15      | 40.5 | 6       | 15   | 29.5             | 5  | 7   | 5     | 7       | 36.8 | 99      | 111  | 6       | 7    | 38.0                       | 5  | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |
| 40 FT           | 17                  | 19   | 11   | 8    | 5             | 6   | 5       | 7     | 41.3  | 33.0 | 37.0    | 6    | 15      | 40.0 | 6       | 15   | 29.0             | 5  | 6.5 | 5     | 7       | 36.8 | 99      | 111  | 6       | 6.5  | 38.0                       | 5  | 12 | 5 | 8    | 0  |  |  |  |  |  |  |
| 42 FT           | 17                  | 20   | 11   | 8    | 5             | 6   | 5       | 6.5   | 41.4  | 37.0 | 37.0    | 6    | 15      | 40.0 | 6       | 15   | 29.0             | 5  | 6.5 | 5     | 7       | 36.9 | 100     | 112  | 6       | 7    | 38.0                       | 5  | 12 | 5 | 7.5  | 0  |  |  |  |  |  |  |
| 44 FT           | 18                  | 20   | 11   | 8    | 6             | 8.5 | 5       | 6     | 41.4  | 38.0 | 38.0    | 6    | 16      | 39.5 | 6       | 16   | 29.0             | 5  | 6.5 | 5     | 7       | 37.0 | 100     | 112  | 6       | 6.5  | 38.0                       | 5  | 12 | 5 | 7.5  | 0  |  |  |  |  |  |  |
| 46 FT           | 18                  | 21   | 12   | 8    | 6             | 8   | 5       | 6.5   | 42.1  | 38.0 | 38.0    | 6    | 15      | 39.5 | 6       | 15   | 29.0             | 5  | 6.5 | 5     | 7       | 37.4 | 101     | 113  | 6       | 6.5  | 38.0                       | 5  | 12 | 5 | 7.5  | 0  |  |  |  |  |  |  |
| 48 FT           | 19                  | 21   | 12   | 8    | 6             | 8   | 5       | 6.5   | 42.0  | 39.0 | 39.0    | 6    | 16      | 39.0 | 6       | 16   | 29.0             | 5  | 6   | 5     | 6.5     | 37.5 | 101     | 113  | 6       | 6.5  | 38.0                       | 5  | 12 | 5 | 7    | 0  |  |  |  |  |  |  |
| 50 FT           | 19                  | 22   | 12   | 8    | 6             | 7.5 | 5       | 6     | 42.1  | 39.0 | 39.0    | 6    | 15      | 39.0 | 6       | 15   | 29.0             | 5  | 6   | 5     | 6.5     | 37.6 | 102     | 114  | 6       | 6.5  | 38.0                       | 5  | 12 | 5 | 7    | 0  |  |  |  |  |  |  |

| SPAN (S) = 7 FT |                     |      |      |      |               |       |         |      |      |      |         |      |    |      |                  |    |       |        |         |      |         |      |      |     |           | HEIGHT (HT) = 9 FT OR 10 FT |      |   |         |   |         |    |  |  |  |  |  |  |  |
|-----------------|---------------------|------|------|------|---------------|-------|---------|------|------|------|---------|------|----|------|------------------|----|-------|--------|---------|------|---------|------|------|-----|-----------|-----------------------------|------|---|---------|---|---------|----|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |       |         |      |      |      |         |      |    |      | BOTTOM SLAB BARS |    |       |        |         |      |         |      |      |     | WALL BARS |                             |      |   |         |   |         |    |  |  |  |  |  |  |  |
|                 |                     |      |      |      | A1 BARS       |       | J3 BARS |      |      |      | H1 BARS |      |    |      | H2 BARS          |    |       |        | A2 BARS |      | J4 BARS |      |      |     | H3 BARS   |                             |      |   | B1 BARS |   | B2 BARS |    |  |  |  |  |  |  |  |
|                 | SIZE                | SPA. | SIZE | SPA. | C1            | K2    |         | SIZE | SPA. | C5   | SIZE    | SPA. | C6 | SIZE | SPA.             | C4 | K3    |        | SIZE    | SPA. | C7      | SIZE | SPA. | C7  | SIZE      | SPA.                        | G1   |   |         |   |         |    |  |  |  |  |  |  |  |
|                 |                     |      |      |      |               | HT=9' | HT=10'  |      |      |      |         |      |    |      |                  |    | HT=9' | HT=10' |         |      |         |      |      |     |           |                             |      |   |         |   |         |    |  |  |  |  |  |  |  |
| 1 FT            | 12                  | 9    | 8    | 8    | 5             | 7.5   | 4       | 6    | 38.1 | 28.0 | 28.0    | 4    | 16 | 73.0 | 4                | 16 | 26.0  | 4      | 7       | 6    | 7       | 68.1 | 113  | 125 | 5         | 7                           | 38.0 | 5 | 12      | 5 | 12      | 12 |  |  |  |  |  |  |  |
| 2 FT            | 12                  | 9    | 8    | 8    | 5             | 7.5   | 5       | 8.5  | 38.1 | 28.0 | 32.0    | 4    | 15 | 73.0 | 4                | 15 | 25.0  | 4      | 6.5     | 6    | 6.5     | 64.9 | 113  | 125 | 5         | 6.5                         | 37.5 | 5 | 12      | 5 | 12      | 12 |  |  |  |  |  |  |  |
| 2'- 4'          | 12                  | 9    | 9    | 8    | 5             | 7.5   | 5       | 6    | 40.8 | 28.0 | 32.0    | 5    | 17 | 75.5 | 5                | 17 | 25.0  | 4      | 6.5     | 6    | 6.5     | 64.9 | 113  | 125 | 5         | 6.5                         | 37.5 | 5 | 12      | 5 | 11.5    | 12 |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 9    | 9    | 8    | 4             | 6     | 5       | 6    | 40.8 | 24.0 | 28.0    | 5    | 17 | 75.5 | 5                | 17 | 23.5  | 4      | 7.5     | 5    | 6       | 57.8 | 113  | 125 | 5         | 7                           | 37.0 | 5 | 12      | 5 | 11.5    | 12 |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 9    | 10   | 8    | 4             | 7     | 5       | 6.5  | 55.0 | 24.0 | 28.0    | 5    | 17 | 39.5 | 5                | 17 | 23.0  | 4      | 7       | 5    | 6.5     | 51.9 | 113  | 125 | 5         | 6.5                         | 36.0 | 5 | 12      | 5 | 11.5    | 12 |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 9    | 10   | 8    | 4             | 7     | 5       | 6    | 49.0 | 28.0 | 28.0    | 5    | 16 | 37.0 | 5                | 16 | 23.5  | 4      | 6.5     | 5    | 6       | 49.3 | 113  | 125 | 5         | 6                           | 35.5 | 5 | 12      | 5 | 10.5    | 0  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 10   | 10   | 8    | 4             | 6.5   | 6       | 7    | 49.0 | 28.0 | 28.0    | 5    | 15 | 36.0 | 5                | 15 | 24.0  | 4      | 6.5     | 5    | 6       | 49.1 | 114  | 126 | 5         | 6                           | 35.5 | 5 | 12      | 5 | 10      | 0  |  |  |  |  |  |  |  |
| 12 FT           | 9                   | 10   | 10   | 8    | 4             | 6     | 5       | 6    | 46.1 | 29.0 | 29.0    | 5    | 16 | 35.5 | 5                | 16 | 23.5  | 5      | 9       | 6    | 7       | 50.3 | 114  | 126 | 5         | 6                           | 35.0 | 5 | 12      | 5 | 9.5     | 0  |  |  |  |  |  |  |  |
| 14 FT           | 9                   | 11   | 10   | 8    | 5             | 9     | 5       | 6    | 44.6 | 29.0 | 29.0    | 5    | 15 | 35.0 | 5                | 15 | 23.5  | 5      | 9       | 6    | 7.5     | 50.6 | 115  | 127 | 5         | 6                           | 35.0 | 5 | 12      | 5 | 8.5     | 0  |  |  |  |  |  |  |  |
| 16 FT           | 9                   | 11   | 10   | 8    | 5             | 9     | 5       | 6    | 41.5 | 29.0 | 29.0    | 5    | 14 | 34.0 | 5                | 14 | 23.5  | 5      | 8.5     | 5    | 6       | 44.0 | 115  | 127 | 5         | 6                           | 35.0 | 5 | 12      | 5 | 9.5     | 0  |  |  |  |  |  |  |  |
| 18 FT           | 10                  | 12   | 10   | 8    | 5             | 8.5   | 5       | 6.5  | 42.0 | 30.0 | 30.0    | 5    | 15 | 34.0 | 5                | 15 | 23.5  | 5      | 8.5     | 5    | 6       | 44.3 | 116  | 128 | 5         | 6                           | 35.0 | 5 | 12      | 5 | 8.5     | 0  |  |  |  |  |  |  |  |
| 20 FT           | 11                  | 13   | 10   | 8    | 5             | 8.5   | 5       | 6    | 42.4 | 31.0 | 31.0    | 5    | 14 | 33.5 | 5                | 14 | 22.5  | 5      | 8.5     | 5    | 6       | 44.6 | 117  | 129 | 6         | 8                           | 38.0 | 5 | 12      | 5 | 8       | 0  |  |  |  |  |  |  |  |
| 22 FT           | 11                  | 13   | 10   | 8    | 5             | 7.5   | 5       | 6    | 42.1 | 31.0 | 31.0    | 5    | 14 | 33.5 | 5                | 14 | 23.5  | 5      | 7.5     | 6    | 7       | 47.3 | 117  | 129 | 6         | 7.5                         | 38.0 | 5 | 12      | 5 | 8       | 0  |  |  |  |  |  |  |  |
| 24 FT           | 12                  | 14   | 10   | 8    | 5             | 7.5   | 5       | 6    | 42.5 | 32.0 | 32.0    | 5    | 13 | 33.5 | 5                | 13 | 22.5  | 5      | 8       | 6    | 7.5     | 47.6 | 118  | 130 | 6         | 7.5                         | 38.0 | 5 | 12      | 5 | 8       | 0  |  |  |  |  |  |  |  |
| 26 FT           | 13                  | 15   | 10   | 8    | 5             | 7.5   | 6       | 7    | 45.8 | 33.0 | 37.0    | 5    | 12 | 33.0 | 5                | 12 | 21.5  | 5      | 8       | 6    | 7.5     | 47.9 | 119  | 131 | 6         | 7.5                         | 38.0 | 5 | 12      | 5 | 8       | 0  |  |  |  |  |  |  |  |
| 28 FT           | 13                  | 16   | 11   | 8    | 5             | 7     | 5       | 6    | 42.9 | 33.0 | 33.0    | 5    | 12 | 32.5 | 5                | 12 | 22.0  | 5      | 8       | 5    | 6.5     | 45.3 | 120  | 132 | 6         | 7.5                         | 38.0 | 5 | 12      | 5 | 7.5     | 0  |  |  |  |  |  |  |  |
| 30 FT           | 14                  | 16   | 11   | 8    | 5             | 7     | 6       | 7.5  | 46.1 | 34.0 | 34.0    | 5    | 12 | 32.0 | 5                | 12 | 21.0  | 5      | 7.5     | 5    | 6       | 45.0 | 120  | 132 | 6         | 7                           | 38.0 | 5 | 12      | 5 | 7.5     | 0  |  |  |  |  |  |  |  |
| 32 FT           | 14                  | 17   | 12   | 8    | 5             | 7     | 5       | 6    | 43.4 | 34.0 | 34.0    | 5    | 12 | 32.0 | 5                | 12 | 21.5  | 5      | 7.5     | 5    | 6.5     | 45.4 | 121  | 133 | 6         | 7                           | 38.0 | 5 | 12      | 5 | 7       | 0  |  |  |  |  |  |  |  |
| 34 FT           | 15                  | 17   | 12   | 8    | 5             | 6.5   | 6       | 8.5  | 52.6 | 35.0 | 35.0    | 6    | 16 | 40.5 | 6                | 16 | 29.5  | 5      | 6.5     | 5    | 6.5     | 45.1 | 121  | 133 | 6         | 7                           | 38.0 | 5 | 12      | 5 | 7       | 0  |  |  |  |  |  |  |  |
| 36 FT           | 15                  | 18   | 13   | 8    | 5             | 6     | 6       | 8.5  | 52.9 | 35.0 | 35.0    | 6    | 16 | 40.0 | 6                | 16 | 29.5  | 5      | 7       | 5    | 6       | 45.5 | 122  | 134 | 6         | 7                           | 38.0 | 5 | 12      | 5 | 6.5     | 0  |  |  |  |  |  |  |  |
| 38 FT           | 16                  | 19   | 13   | 8    | 5             | 6.5   | 6       | 8    | 53.1 | 36.0 | 36.0    | 6    | 16 | 39.5 | 6                | 16 | 29.0  | 5      | 7       | 5    | 6       | 45.9 | 123  | 135 | 6         | 7                           | 38.0 | 5 | 12      | 5 | 6.5     | 0  |  |  |  |  |  |  |  |
| 40 FT           | 17                  | 19   | 13   | 8    | 5             | 6     | 6       | 7.5  | 53.4 | 37.0 | 37.0    | 5    | 12 | 35.0 | 5                | 12 | 25.0  | 5      | 6.5     | 5    | 6       | 45.8 | 123  | 135 | 6         | 6.5                         | 38.0 | 5 | 12      | 5 | 6.5     | 0  |  |  |  |  |  |  |  |
| 42 FT           | 17                  | 20   | 14   | 8    | 5             | 6     | 6       | 8    | 53.8 | 37.0 | 37.0    | 6    | 16 | 39.0 | 6                | 16 | 29.0  | 5      | 6.5     | 5    | 6       | 46.1 | 124  | 136 | 6         | 6.5                         | 38.5 | 5 | 12      | 5 | 6       | 0  |  |  |  |  |  |  |  |
| 44 FT           | 17                  | 20   | 14   | 8    | 6             | 8.5   | 6       | 7.5  | 53.6 | 37.0 | 37.0    | 6    | 15 | 39.0 | 6                | 15 | 29.0  | 5      | 6       | 5    | 6       | 46.1 | 124  | 136 | 6         | 6.5                         | 38.5 | 5 | 12      | 5 | 6       | 0  |  |  |  |  |  |  |  |
| 46 FT           | 18                  | 21   | 14   | 8    | 6             | 8     | 6       | 7    | 53.9 | 38.0 | 38.0    | 6    | 17 | 38.5 | 6                | 17 | 29.0  | 5      | 6.5     | 5    | 6       | 46.5 | 125  | 137 | 6         | 6.5                         | 38.0 | 5 | 12      | 5 | 6       | 0  |  |  |  |  |  |  |  |
| 48 FT           | 18                  | 22   | 15   | 8    | 6             | 8     | 6       | 7.5  | 54.3 | 38.0 | 42.0    | 6    | 16 | 38.5 | 6                | 16 | 29.0  | 5      | 6.5     | 6    | 8       | 49.9 | 126  | 138 | 6         | 6.5                         | 38.5 | 5 | 12      | 5 | 6       | 0  |  |  |  |  |  |  |  |
| 50 FT           | 18                  | 22   | 15   | 8    | 6             | 7.5   | 6       | 7.5  | 54.3 | 38.0 | 42.0    | 6    | 15 | 38.5 | 6                | 15 | 29.0  | 5      | 6       | 6    | 8       | 49.9 | 126  | 138 | 6         | 6                           | 38.5 | 5 | 12      | 6 | 8       | 0  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 7 FEET  
HEIGHT (HT): 9 THRU 10 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
9 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

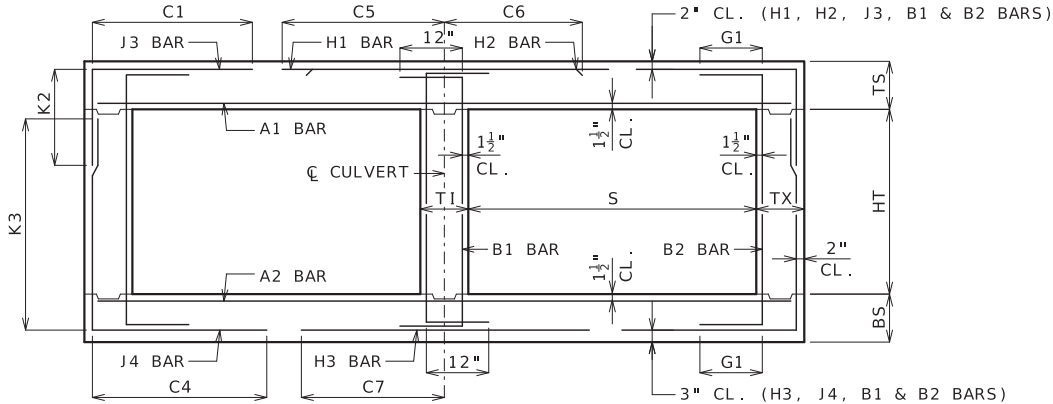
| SPAN (S) = 8 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |      |         |                  |      |         |      |         |      |      |       |       |       |         |      |           |         |      | HEIGHT (HT) = 4 FT OR 5 FT OR 6 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------|---------|------------------|------|---------|------|---------|------|------|-------|-------|-------|---------|------|-----------|---------|------|------------------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |      |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |       |         |      | WALL BARS |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |      | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |       | H3 BARS |      |           | B1 BARS |      | B2 BARS                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5   | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |       | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE                               | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=4' | HT=5' | HT=6' |         |      |      |         |                  |      |         |      |         |      |      | HT=4' | HT=5' | HT=6' |         |      |           |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 12               | 9  | 8  | 8  | 5             | 7    | 4       | 8.5  | 41.8 | 28.0  | 28.0  | 28.0  | 4       | 12   | 81.5 | 4       | 12               | 26.5 | 4       | 7    | 4       | 8    | 43.0 | 53    | 65    | 77    | 5       | 6.5  | 41.0      | 5       | 12   | 5                                  | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 13               | 9  | 8  | 8  | 5             | 7.5  | 4       | 7.5  | 41.8 | 29.0  | 29.0  | 29.0  | 4       | 13   | 81.5 | 4       | 13               | 26.5 | 4       | 6.5  | 4       | 7    | 39.1 | 53    | 65    | 77    | 5       | 6    | 40.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 13               | 9  | 8  | 8  | 5             | 7.5  | 5       | 6.5  | 41.8 | 29.0  | 29.0  | 29.0  | 5       | 15   | 81.5 | 5       | 15               | 26.5 | 4       | 6    | 4       | 6    | 39.1 | 53    | 65    | 77    | 6       | 6.5  | 42.5      | 5       | 9.5  | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 6    | 5       | 6.5  | 36.4 | 24.0  | 24.0  | 24.0  | 5       | 15   | 51.0 | 5       | 15               | 26.5 | 4       | 6    | 4       | 6    | 35.3 | 52    | 64    | 76    | 6       | 6.5  | 42.5      | 5       | 9.5  | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 9  | 8  | 8  | 4             | 6    | 5       | 6.5  | 34.3 | 24.0  | 24.0  | 24.0  | 5       | 15   | 42.5 | 5       | 15               | 26.0 | 4       | 6    | 4       | 7.5  | 33.1 | 53    | 65    | 77    | 6       | 7    | 42.0      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 9  | 8  | 8  | 4             | 6    | 5       | 6    | 33.1 | 24.0  | 24.0  | 24.0  | 5       | 13   | 40.5 | 5       | 13               | 25.5 | 5       | 8.5  | 4       | 7    | 31.6 | 53    | 65    | 77    | 6       | 6.5  | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 9                | 10 | 8  | 8  | 5             | 8.5  | 4       | 6    | 31.9 | 25.0  | 25.0  | 25.0  | 5       | 14   | 39.5 | 5       | 14               | 25.5 | 5       | 8    | 4       | 8    | 30.4 | 54    | 66    | 78    | 6       | 7    | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 10               | 11 | 8  | 8  | 5             | 8    | 4       | 6    | 30.6 | 26.0  | 26.0  | 26.0  | 5       | 14   | 39.0 | 5       | 14               | 25.0 | 5       | 8    | 4       | 8    | 29.3 | 55    | 67    | 79    | 6       | 7    | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 11               | 12 | 8  | 8  | 5             | 8    | 4       | 6    | 29.8 | 27.0  | 27.0  | 27.0  | 5       | 14   | 38.5 | 5       | 14               | 25.0 | 5       | 7.5  | 4       | 7.5  | 28.6 | 56    | 68    | 80    | 6       | 7    | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 11               | 13 | 8  | 8  | 5             | 7.5  | 5       | 8.5  | 29.6 | 27.0  | 27.0  | 27.0  | 5       | 12   | 38.5 | 5       | 12               | 25.0 | 5       | 7.5  | 4       | 8    | 28.0 | 57    | 69    | 81    | 6       | 7    | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 12               | 13 | 8  | 8  | 5             | 7.5  | 4       | 6    | 27.5 | 28.0  | 28.0  | 28.0  | 5       | 13   | 37.5 | 5       | 13               | 25.0 | 5       | 7    | 4       | 7.5  | 26.8 | 57    | 69    | 81    | 6       | 7    | 41.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 12               | 14 | 8  | 8  | 5             | 7    | 5       | 8.5  | 27.8 | 28.0  | 28.0  | 28.0  | 5       | 12   | 37.5 | 5       | 12               | 25.0 | 5       | 7    | 4       | 7.5  | 26.4 | 58    | 70    | 82    | 6       | 7    | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 13               | 15 | 8  | 8  | 5             | 6.5  | 6       | 8.5  | 27.4 | 29.0  | 29.0  | 29.0  | 5       | 12   | 37.5 | 5       | 12               | 25.0 | 5       | 7    | 4       | 7    | 26.4 | 59    | 71    | 83    | 6       | 7    | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 14               | 16 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 27.3 | 30.0  | 30.0  | 30.0  | 5       | 12   | 37.5 | 5       | 12               | 24.5 | 5       | 7    | 4       | 6.5  | 26.5 | 60    | 72    | 84    | 6       | 7    | 41.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 15               | 16 | 8  | 8  | 5             | 6.5  | 5       | 8    | 31.9 | 31.0  | 31.0  | 31.0  | 6       | 16   | 46.5 | 6       | 16               | 33.0 | 5       | 6.5  | 4       | 6.5  | 26.6 | 60    | 72    | 84    | 6       | 7    | 41.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 16               | 17 | 8  | 8  | 5             | 6    | 5       | 7    | 31.8 | 32.0  | 32.0  | 32.0  | 6       | 15   | 46.0 | 6       | 15               | 32.0 | 5       | 6.5  | 4       | 6    | 26.8 | 61    | 73    | 85    | 6       | 6.5  | 41.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 16               | 18 | 8  | 8  | 5             | 6    | 5       | 7    | 32.0 | 32.0  | 32.0  | 36.0  | 6       | 15   | 46.0 | 6       | 15               | 33.0 | 5       | 6.5  | 5       | 6.5  | 26.6 | 62    | 74    | 86    | 6       | 6.5  | 41.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 17               | 19 | 8  | 8  | 5             | 6    | 5       | 6.5  | 31.9 | 37.0  | 37.0  | 37.0  | 6       | 14   | 45.5 | 6       | 14               | 32.0 | 5       | 6.5  | 5       | 6.5  | 26.8 | 63    | 75    | 87    | 6       | 6.5  | 41.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 18               | 19 | 8  | 8  | 6             | 8.5  | 5       | 6.5  | 31.8 | 38.0  | 38.0  | 38.0  | 6       | 13   | 45.5 | 6       | 13               | 31.0 | 5       | 6    | 5       | 6.5  | 26.9 | 63    | 75    | 87    | 6       | 6    | 41.0      | 5       | 12   | 5                                  | 11   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 18               | 20 | 8  | 8  | 6             | 8    | 5       | 6.5  | 31.9 | 38.0  | 38.0  | 38.0  | 6       | 13   | 45.5 | 6       | 13               | 32.0 | 5       | 6    | 5       | 6    | 26.9 | 64    | 76    | 88    | 6       | 6    | 41.0      | 5       | 12   | 5                                  | 10   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 19               | 21 | 8  | 8  | 6             | 8    | 5       | 6    | 32.0 | 39.0  | 39.0  | 39.0  | 6       | 13   | 45.0 | 6       | 13               | 31.0 | 5       | 6    | 6       | 7.5  | 30.1 | 65    | 77    | 89    | 6       | 6    | 41.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 20               | 22 | 8  | 8  | 6             | 7.5  | 6       | 7.5  | 36.0 | 44.0  | 44.0  | 44.0  | 6       | 13   | 44.5 | 6       | 13               | 30.5 | 5       | 6    | 6       | 7    | 30.4 | 66    | 78    | 90    | 6       | 6    | 41.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 20               | 22 | 8  | 8  | 6             | 7.5  | 6       | 7.5  | 36.0 | 44.0  | 44.0  | 44.0  | 6       | 12   | 44.5 | 6       | 12               | 30.5 | 6       | 8.5  | 6       | 7    | 30.3 | 66    | 78    | 90    | 6       | 6    | 41.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 21               | 23 | 8  | 8  | 6             | 7.5  | 6       | 7    | 36.0 | 45.0  | 45.0  | 45.0  | 6       | 12   | 43.5 | 6       | 12               | 30.0 | 6       | 8.5  | 6       | 6.5  | 30.5 | 67    | 79    | 91    | 6       | 6    | 41.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 21               | 23 | 8  | 8  | 6             | 7    | 6       | 7    | 36.0 | 45.0  | 45.0  | 45.0  | 6       | 12   | 43.5 | 6       | 12               | 30.0 | 6       | 8    | 6       | 6.5  | 30.5 | 67    | 79    | 91    | 7       | 7.5  | 44.0      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 22               | 24 | 8  | 8  | 6             | 7    | 6       | 6.5  | 36.1 | 46.0  | 46.0  | 46.0  | 6       | 12   | 43.0 | 6       | 12               | 30.0 | 6       | 8    | 6       | 6    | 30.8 | 68    | 80    | 92    | 7       | 7.5  | 44.0      | 5       | 12   | 5                                  | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 22               | 24 | 8  | 8  | 6             | 6.5  | 6       | 6.5  | 36.1 | 46.0  | 46.0  | 46.0  | 6       | 12   | 43.0 | 6       | 12               | 30.0 | 6       | 7.5  | 6       | 6    | 30.8 | 68    | 80    | 92    | 7       | 7.5  | 44.0      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 8 FT |                  |      |      |      |               |       |         |       |      |      |         |      |         |    |         |      |                  |       |       |       |         |      |         |      |         |      |      |     |           | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |    |   |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|------|------|------|---------------|-------|---------|-------|------|------|---------|------|---------|----|---------|------|------------------|-------|-------|-------|---------|------|---------|------|---------|------|------|-----|-----------|------------------------------------|----|---|-----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |       |         |       |      |      |         |      |         |    |         |      | BOTTOM SLAB BARS |       |       |       |         |      |         |      |         |      |      |     | WALL BARS |                                    |    |   |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |      |      |      | A1 BARS       |       | J3 BARS |       |      |      | H1 BARS |      | H2 BARS |    | A2 BARS |      | J4 BARS          |       |       |       | H3 BARS |      | B1 BARS |      | B2 BARS |      |      |     |           |                                    |    |   |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | SIZE             | SPA. | SIZE | SPA. | C1            | K2    |         |       | SIZE | SPA. | C5      | SIZE | SPA.    | C6 | SIZE    | SPA. | C4               | K3    |       |       | SIZE    | SPA. | C7      | SIZE | SPA.    | SIZE | SPA. | G1  |           |                                    |    |   |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |      |      |      |               | HT=7' | HT=8'   | HT=9' |      |      |         |      |         |    |         |      |                  | HT=7' | HT=8' | HT=9' |         |      |         |      |         |      |      |     |           |                                    |    |   |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 12               | 9    | 8    | 8    | 5             | 7     | 4       | 6.5   | 41.8 | 28.0 | 28.0    | 28.0 | 4       | 12 | 81.5    | 4    | 12               | 27.5  | 4     | 6     | 5       | 6.5  | 61.6    | 89   | 101     | 113  | 5    | 6   | 41.0      | 5                                  | 12 | 5 | 12  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 13               | 10   | 8    | 8    | 5             | 7     | 4       | 6.5   | 41.8 | 29.0 | 29.0    | 29.0 | 4       | 13 | 81.5    | 4    | 13               | 27.0  | 4     | 6.5   | 4       | 6    | 58.3    | 90   | 102     | 114  | 5    | 6.5 | 40.5      | 5                                  | 12 | 5 | 12  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 13               | 10   | 8    | 8    | 5             | 7     | 6       | 7.5   | 43.8 | 29.0 | 29.0    | 29.0 | 5       | 15 | 83.5    | 5    | 15               | 27.0  | 4     | 6     | 5       | 6    | 58.3    | 90   | 102     | 114  | 5    | 6   | 40.5      | 5                                  | 11 | 5 | 12  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 9    | 8    | 8    | 4             | 6     | 6       | 7.5   | 43.8 | 24.0 | 24.0    | 28.0 | 5       | 15 | 83.5    | 5    | 15               | 27.0  | 4     | 6     | 5       | 6    | 52.3    | 89   | 101     | 113  | 5    | 6   | 40.0      | 5                                  | 11 | 5 | 12  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 10   | 8    | 8    | 4             | 6     | 6       | 7.5   | 51.4 | 24.0 | 24.0    | 28.0 | 5       | 15 | 43.0    | 5    | 15               | 26.0  | 4     | 6.5   | 5       | 6    | 49.0    | 90   | 102     | 114  | 5    | 6.5 | 39.5      | 5                                  | 12 | 5 | 12  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 11   | 8    | 8    | 4             | 6     | 6       | 7.5   | 46.6 | 24.0 | 24.0    | 28.0 | 5       | 13 | 40.5    | 5    | 13               | 25.5  | 4     | 6.5   | 5       | 6.5  | 46.3    | 91   | 103     | 115  | 5    | 6   | 39.0      | 5                                  | 12 | 5 | 12  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 9                | 11   | 8    | 8    | 5             | 8.5   | 6       | 7     | 45.3 | 25.0 | 25.0    | 29.0 | 5       | 14 | 39.5    | 5    | 14               | 25.5  | 5     | 8.5   | 5       | 6    | 43.6    | 91   | 103     | 115  | 5    | 6   | 38.5      | 5                                  | 12 | 5 | 11  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 10               | 12   | 8    | 8    | 5             | 8     | 6       | 7     | 44.4 | 26.0 | 30.0    | 30.0 | 5       | 14 | 39.0    | 5    | 14               | 25.0  | 5     | 8.5   | 5       | 6    | 42.5    | 92   | 104     | 116  | 5    | 6   | 38.5      | 5                                  | 12 | 5 | 10  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 11               | 12   | 8    | 8    | 5             | 8     | 6       | 7     | 43.5 | 27.0 | 31.0    | 35.0 | 5       | 14 | 38.5    | 5    | 14               | 25.0  | 5     | 7.5   | 6       | 7    | 44.4    | 92   | 104     | 116  | 6    | 7   | 41.5      | 5                                  | 12 | 5 | 9.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 11               | 13   | 8    | 8    | 5             | 7.5   | 6       | 6.5   | 42.9 | 27.0 | 31.0    | 35.0 | 5       | 12 | 38.0    | 5    | 12               | 25.0  | 5     | 7.5   | 6       | 7    | 44.0    | 93   | 105     | 117  | 6    | 7.5 | 41.5      | 5                                  | 12 | 5 | 9.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 12               | 13   | 8    | 8    | 5             | 7.5   | 5       | 6     | 37.1 | 28.0 | 32.0    | 32.0 | 5       | 13 | 37.5    | 5    | 13               | 25.0  | 5     | 7     | 6       | 7.5  | 41.1    | 93   | 105     | 117  | 6    | 7   | 41.0      | 5                                  | 12 | 5 | 9.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 12               | 14   | 8    | 8    | 5             | 7     | 6       | 7     | 39.9 | 32.0 | 32.0    | 36.0 | 5       | 12 | 37.5    | 5    | 12               | 25.0  | 5     | 7     | 6       | 7.5  | 41.1    | 94   | 106     | 118  | 6    | 7   | 41.0      | 5                                  | 12 | 5 | 9.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 13               | 15   | 8    | 8    | 5             | 6.5   | 6       | 7     | 39.9 | 33.0 | 33.0    | 37.0 | 5       | 12 | 37.0    | 5    | 12               | 25.0  | 5     | 7     | 6       | 7.5  | 41.3    | 95   | 107     | 119  | 6    | 7   | 41.0      | 5                                  | 12 | 5 | 9.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 14               | 16   | 8    | 8    | 5             | 6.5   | 6       | 7     | 40.0 | 34.0 | 34.0    | 38.0 | 5       | 12 | 37.0    | 5    | 12               | 24.0  | 5     | 7     | 6       | 7    | 41.4    | 96   | 108     | 120  | 6    | 7   | 41.0      | 5                                  | 12 | 5 | 9   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 15               | 16   | 9    | 8    | 5             | 6.5   | 5       | 6     | 42.4 | 35.0 | 35.0    | 35.0 | 6       | 16 | 45.5    | 6    | 16               | 32.0  | 5     | 6.5   | 5       | 6    | 38.5    | 96   | 108     | 120  | 6    | 7   | 41.0      | 5                                  | 12 | 5 | 8.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 15               | 17   | 10   | 8    | 5             | 6     | 5       | 6.5   | 42.9 | 31.0 | 35.0    | 35.0 | 6       | 16 | 45.5    | 6    | 16               | 33.0  | 5     | 6.5   | 5       | 7.5  | 38.8    | 97   | 109     | 121  | 6    | 6.5 | 41.5      | 5                                  | 12 | 5 | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 16               | 18   | 11   | 8    | 5             | 6     | 5       | 6.5   | 43.6 | 32.0 | 36.0    | 36.0 | 6       | 15 | 44.5    | 6    | 15               | 31.5  | 5     | 6.5   | 5       | 7    | 39.1    | 98   | 110     | 122  | 6    | 6.5 | 41.5      | 5                                  | 12 | 5 | 8.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 17               | 19   | 11   | 8    | 5             | 6     | 5       | 6.5   | 43.6 | 33.0 | 37.0    | 37.0 | 6       | 14 | 44.0    | 6    | 14               | 31.0  | 5     | 6.5   | 5       | 7    | 39.4    | 99   | 111     | 123  | 6    | 6   | 41.5      | 5                                  | 12 | 5 | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 17               | 20   | 11   | 8    | 6             | 8     | 5       | 6     | 43.8 | 37.0 | 37.0    | 37.0 | 6       | 14 | 44.0    | 6    | 14               | 31.5  | 5     | 6.5   | 5       | 7    | 39.5    | 100  | 112     | 124  | 6    | 6   | 41.5      | 5                                  | 12 | 5 | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 18               | 20   | 12   | 8    | 6             | 8     | 5       | 6.5   | 44.3 | 38.0 | 38.0    | 38.0 | 6       | 13 | 43.5    | 6    | 13               | 30.5  | 5     | 6     | 5       | 6.5  | 39.6    | 100  | 112     | 124  | 6    | 6   | 41.5      | 5                                  | 12 | 5 | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 18               | 21   | 12   | 8    | 6             | 7.5   | 5       | 6     | 44.4 | 38.0 | 38.0    | 38.0 | 6       | 13 | 43.5    | 6    | 13               | 31.0  | 5     | 6     | 5       | 6.5  | 39.9    | 101  | 113     | 125  | 6    | 6   | 41.5      | 5                                  | 12 | 5 | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 19               | 22   | 12   | 8    | 6             | 7.5   | 6       | 8.5   | 48.4 | 39.0 | 39.0    | 39.0 | 6       | 13 | 42.5    | 6    | 13               | 30.0  | 5     | 6     | 5       | 6.5  | 40.1    | 102  | 114     | 126  | 6    | 6   | 41.5      | 5                                  | 12 | 5 | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 19               | 22   | 13   | 8    | 6             | 7     | 5       | 6     | 45.0 | 39.0 | 39.0    | 39.0 | 6       | 13 | 42.5    | 6    | 13               | 30.5  | 6     | 8     | 5       | 6.5  | 40.3    | 102  | 114     | 126  | 7    | 7.5 | 44.5      | 5                                  | 12 | 5 | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 20               | 23   | 13   | 8    | 6             | 7     | 6       | 8.5   | 49.1 | 40.0 | 40.0    | 40.0 | 6       | 13 | 42.0    | 6    | 13               | 30.0  | 6     | 8     | 5       | 6    | 40.5    | 103  | 115     | 127  | 7    | 7.5 | 44.5      | 5                                  | 12 | 5 | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 20               | 24   | 13   | 8    | 6             | 6.5   | 6       | 8     | 49.3 | 40.0 | 40.0    | 40.0 | 6       | 12 | 42.0    | 6    | 12               | 30.0  | 6     | 8     | 5       | 6    | 40.6    | 104  | 116     | 128  | 7    | 7.5 | 44.5      | 5                                  | 12 | 5 | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 21               | 24   | 13   | 8    | 6             | 7     | 6       | 7.5   | 49.1 | 41.0 | 41.0    | 41.0 | 6       | 13 | 41.5    | 6    | 13               | 29.5  | 6     | 8     | 5       | 6    | 40.8    | 104  | 116     | 128  | 7    | 7.5 | 44.5      | 5                                  | 12 | 5 | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 21               | 25   | 14   | 8    | 6             | 6.5   | 6       | 8     | 49.9 | 41.0 | 41.0    | 41.0 | 6       | 13 | 41.5    | 6    | 13               | 29.5  | 6     | 8     | 5       | 6.5  | 41.1    | 105  | 117     | 129  | 7    | 7.5 | 44.5      | 5                                  | 12 | 5 | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 8 FT |                     |    |    |    |               |      |         |      |      |                        |         |      |         |      |         |      |                  |      |      |      |         |      |                        |     |         | HEIGHT (HT) = 10 FT OR 11 FT |      |      |           |      |      |      |    |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|------------------------|---------|------|---------|------|---------|------|------------------|------|------|------|---------|------|------------------------|-----|---------|------------------------------|------|------|-----------|------|------|------|----|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                        |         |      |         |      |         |      | BOTTOM SLAB BARS |      |      |      |         |      |                        |     |         |                              |      |      | WALL BARS |      |      |      |    |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |                        | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |      | B1 BARS                |     | B2 BARS |                              |      |      |           |      |      |      |    |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=10'<br>HT=11' |         | SIZE | SPA.    | C5   | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4   | K3<br>HT=10'<br>HT=11' |     | SIZE    | SPA.                         | C7   | SIZE | SPA.      | SIZE | SPA. | G1   |    |  |  |  |  |
|                 | 1 FT                | 12 | 9  | 8  | 9             | 5    | 7       | 5    | 7.5  | 41.9                   | 32.0    | 32.0 | 4       | 12   | 81.5    | 4    | 12               | 27.5 | 5    | 9    | 6       | 6    | 73.9                   | 125 | 137     | 5                            | 6    | 41.5 | 5         | 12   | 5    | 10.5 | 12 |  |  |  |  |
| 2 FT            | 13                  | 10 | 9  | 9  | 5             | 7    | 5       | 8    | 42.5 | 29.0                   | 33.0    | 4    | 13      | 82.0 | 4       | 13   | 27.0             | 4    | 6    | 5    | 6       | 66.8 | 126                    | 138 | 5       | 6.5                          | 41.0 | 5    | 12        | 5    | 11   | 12   |    |  |  |  |  |
| 2'- 4'          | 13                  | 11 | 9  | 9  | 5             | 7    | 6       | 7    | 44.5 | 29.0                   | 33.0    | 5    | 16      | 84.0 | 5       | 16   | 27.0             | 4    | 6    | 5    | 6       | 66.8 | 127                    | 139 | 5       | 6.5                          | 41.0 | 5    | 10.5      | 5    | 9.5  | 12   |    |  |  |  |  |
| 4 FT            | 8                   | 11 | 9  | 9  | 4             | 6    | 6       | 7    | 44.5 | 24.0                   | 28.0    | 5    | 16      | 84.0 | 5       | 16   | 27.0             | 4    | 7    | 5    | 6       | 66.0 | 127                    | 139 | 5       | 7.5                          | 41.0 | 5    | 10.5      | 5    | 9.5  | 12   |    |  |  |  |  |
| 6 FT            | 8                   | 11 | 9  | 9  | 4             | 6    | 6       | 7    | 61.5 | 28.0                   | 32.0    | 5    | 15      | 43.0 | 5       | 15   | 26.0             | 4    | 6.5  | 6    | 7       | 64.5 | 127                    | 139 | 5       | 7                            | 40.0 | 5    | 11.5      | 5    | 9    | 12   |    |  |  |  |  |
| 8 FT            | 8                   | 11 | 9  | 9  | 4             | 6    | 6       | 7    | 55.6 | 28.0                   | 32.0    | 5    | 14      | 40.5 | 5       | 14   | 25.5             | 4    | 6    | 6    | 6.5     | 60.4 | 127                    | 139 | 5       | 6                            | 39.5 | 5    | 11.5      | 5    | 8.5  | 0    |    |  |  |  |  |
| 10 FT           | 9                   | 11 | 9  | 9  | 5             | 8.5  | 6       | 7.5  | 54.9 | 29.0                   | 33.0    | 5    | 14      | 39.5 | 5       | 14   | 25.5             | 5    | 8.5  | 6    | 6       | 57.5 | 127                    | 139 | 5       | 6                            | 39.0 | 5    | 12        | 5    | 8.5  | 0    |    |  |  |  |  |
| 12 FT           | 10                  | 11 | 9  | 9  | 5             | 8    | 5       | 6    | 51.1 | 30.0                   | 30.0    | 5    | 14      | 39.0 | 5       | 14   | 25.5             | 5    | 7.5  | 6    | 6       | 55.3 | 127                    | 139 | 6       | 7                            | 41.5 | 5    | 12        | 5    | 8.5  | 0    |    |  |  |  |  |
| 14 FT           | 10                  | 12 | 9  | 9  | 5             | 8    | 6       | 6.5  | 52.0 | 30.0                   | 34.0    | 5    | 13      | 38.5 | 5       | 13   | 25.5             | 5    | 7.5  | 6    | 6       | 54.8 | 128                    | 140 | 6       | 7                            | 41.5 | 5    | 12        | 5    | 8.5  | 0    |    |  |  |  |  |
| 16 FT           | 11                  | 13 | 10 | 9  | 5             | 7.5  | 5       | 6    | 48.6 | 31.0                   | 31.0    | 5    | 13      | 38.0 | 5       | 13   | 25.5             | 5    | 7.5  | 6    | 6.5     | 54.1 | 129                    | 141 | 6       | 7.5                          | 41.5 | 5    | 12        | 5    | 8    | 0    |    |  |  |  |  |
| 18 FT           | 11                  | 13 | 10 | 9  | 5             | 7.5  | 5       | 6    | 45.1 | 31.0                   | 31.0    | 5    | 12      | 37.0 | 5       | 12   | 25.0             | 5    | 7    | 6    | 6.5     | 50.4 | 129                    | 141 | 6       | 7                            | 41.5 | 5    | 12        | 5    | 8    | 0    |    |  |  |  |  |
| 20 FT           | 12                  | 14 | 10 | 9  | 5             | 7    | 6       | 7.5  | 48.4 | 32.0                   | 36.0    | 5    | 13      | 37.0 | 5       | 13   | 25.0             | 5    | 7    | 6    | 6.5     | 50.5 | 130                    | 142 | 6       | 7.5                          | 41.5 | 5    | 12        | 5    | 8    | 0    |    |  |  |  |  |
| 22 FT           | 13                  | 15 | 10 | 9  | 5             | 7    | 6       | 7    | 48.5 | 33.0                   | 37.0    | 5    | 12      | 37.0 | 5       | 12   | 24.5             | 5    | 7    | 6    | 6.5     | 50.6 | 131                    | 143 | 6       | 7                            | 41.5 | 5    | 12        | 5    | 8    | 0    |    |  |  |  |  |
| 24 FT           | 13                  | 16 | 11 | 9  | 5             | 6.5  | 6       | 8    | 48.5 | 33.0                   | 33.0    | 5    | 12      | 36.5 | 5       | 12   | 25.0             | 5    | 7    | 5    | 6       | 47.8 | 132                    | 144 | 6       | 7                            | 41.5 | 5    | 12        | 5    | 7.5  | 0    |    |  |  |  |  |
| 26 FT           | 14                  | 16 | 12 | 9  | 5             | 6.5  | 5       | 6    | 46.0 | 34.0                   | 34.0    | 5    | 12      | 36.0 | 5       | 12   | 24.5             | 5    | 6    | 5    | 6       | 47.5 | 132                    | 144 | 6       | 7                            | 41.5 | 5    | 12        | 5    | 7    | 0    |    |  |  |  |  |
| 28 FT           | 15                  | 17 | 12 | 9  | 5             | 6.5  | 6       | 8    | 55.3 | 35.0                   | 35.0    | 6    | 16      | 44.5 | 6       | 16   | 32.5             | 5    | 6.5  | 5    | 6       | 47.8 | 133                    | 145 | 6       | 6.5                          | 41.5 | 5    | 12        | 5    | 7    | 0    |    |  |  |  |  |
| 30 FT           | 16                  | 18 | 13 | 9  | 5             | 6.5  | 6       | 8    | 55.8 | 36.0                   | 36.0    | 6    | 15      | 44.0 | 6       | 15   | 31.5             | 5    | 6.5  | 5    | 6       | 48.0 | 134                    | 146 | 6       | 6.5                          | 41.5 | 5    | 12        | 5    | 6.5  | 0    |    |  |  |  |  |
| 32 FT           | 16                  | 19 | 13 | 9  | 5             | 6    | 6       | 7.5  | 55.8 | 36.0                   | 36.0    | 6    | 15      | 44.0 | 6       | 15   | 32.0             | 5    | 6.5  | 5    | 6       | 48.3 | 135                    | 147 | 6       | 6                            | 41.5 | 5    | 12        | 5    | 6.5  | 0    |    |  |  |  |  |
| 34 FT           | 17                  | 20 | 13 | 9  | 5             | 6    | 6       | 7    | 56.0 | 37.0                   | 37.0    | 6    | 14      | 43.5 | 6       | 14   | 31.0             | 5    | 6.5  | 5    | 6       | 48.5 | 136                    | 148 | 6       | 6.5                          | 41.5 | 5    | 12        | 5    | 6.5  | 0    |    |  |  |  |  |
| 36 FT           | 17                  | 20 | 14 | 9  | 6             | 8    | 6       | 7.5  | 56.1 | 37.0                   | 37.0    | 6    | 14      | 43.0 | 6       | 14   | 31.5             | 5    | 6    | 5    | 6       | 48.6 | 136                    | 148 | 6       | 6                            | 41.5 | 5    | 12        | 5    | 6    | 0    |    |  |  |  |  |
| 38 FT           | 18                  | 21 | 14 | 9  | 6             | 8    | 6       | 7    | 56.4 | 38.0                   | 38.0    | 6    | 13      | 42.5 | 6       | 13   | 30.5             | 5    | 6    | 5    | 6       | 48.9 | 137                    | 149 | 6       | 6                            | 41.5 | 5    | 12        | 5    | 6    | 0    |    |  |  |  |  |
| 40 FT           | 18                  | 22 | 15 | 9  | 6             | 7    | 6       | 7.5  | 56.8 | 38.0                   | 42.0    | 6    | 13      | 42.5 | 6       | 13   | 30.5             | 5    | 6    | 6    | 8       | 52.3 | 138                    | 150 | 6       | 6                            | 41.5 | 5    | 12        | 6    | 8    | 0    |    |  |  |  |  |
| 42 FT           | 19                  | 22 | 15 | 9  | 6             | 7.5  | 6       | 7    | 57.0 | 39.0                   | 43.0    | 6    | 14      | 42.0 | 6       | 14   | 30.0             | 6    | 8.5  | 6    | 8       | 52.3 | 138                    | 150 | 7       | 7.5                          | 44.5 | 5    | 12        | 6    | 8    | 0    |    |  |  |  |  |
| 44 FT           | 19                  | 23 | 15 | 9  | 6             | 6.5  | 6       | 6.5  | 56.9 | 39.0                   | 43.0    | 6    | 13      | 42.0 | 6       | 13   | 30.0             | 6    | 8.5  | 6    | 8       | 52.5 | 139                    | 151 | 7       | 8                            | 44.5 | 5    | 12        | 6    | 8    | 0    |    |  |  |  |  |
| 46 FT           | 20                  | 24 | 16 | 9  | 6             | 7    | 6       | 7    | 57.6 | 40.0                   | 44.0    | 6    | 14      | 41.5 | 6       | 14   | 30.0             | 6    | 8    | 6    | 7.5     | 52.9 | 140                    | 152 | 7       | 8                            | 44.5 | 5    | 12        | 6    | 8    | 0    |    |  |  |  |  |
| 48 FT           | 20                  | 24 | 16 | 9  | 6             | 6.5  | 6       | 6.5  | 57.5 | 40.0                   | 44.0    | 6    | 13      | 41.5 | 6       | 13   | 30.0             | 6    | 8    | 6    | 7.5     | 52.9 | 140                    | 152 | 7       | 7.5                          | 44.5 | 5    | 12        | 6    | 8    | 0    |    |  |  |  |  |
| 50 FT           | 21                  | 25 | 16 | 9  | 6             | 6.5  | 6       | 6    | 57.8 | 41.0                   | 45.0    | 6    | 14      | 41.0 | 6       | 14   | 30.0             | 6    | 8    | 6    | 7.5     | 53.1 | 141                    | 153 | 7       | 7.5                          | 44.5 | 5    | 12        | 6    | 8    | 0    |    |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

BRYAN A. HARTNAGEL

NUMBER PE-2002024473

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 8 FEET  
HEIGHT (HT): 10 THRU 11 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
11 OF 27

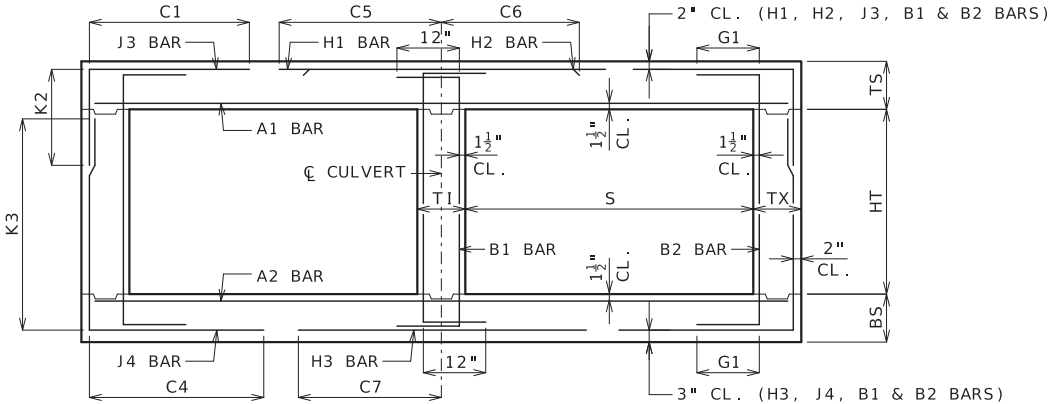
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| SPAN (S) = 9 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |      |         |                  |      |         |      |         |      |      |       |       |       |         |      |           |         | HEIGHT (HT) = 5 FT OR 6 FT OR 7 FT |         |      |    |   |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------|---------|------------------|------|---------|------|---------|------|------|-------|-------|-------|---------|------|-----------|---------|------------------------------------|---------|------|----|---|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |      |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |       |         |      | WALL BARS |         |                                    |         |      |    |   |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |      | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |       | H3 BARS |      |           | B1 BARS |                                    | B2 BARS |      |    |   |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | HT=5' | HT=6' | HT=7' | SIZE    | SPA. | C5   | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | HT=5' | HT=6' | HT=7' | SIZE    | SPA. | C7        | SIZE    | SPA.                               | SIZE    | SPA. | G1 |   |  |  |  |  |  |  |  |  |  |  |
|                 | 1 FT             | 13 | 9  | 8  | 8             | 5    | 6.5     | 4    | 7.5  | 45.3  | 29.0  | 29.0  | 29.0    | 5    | 17   | 89.5    | 5                | 17   | 28.5    | 4    | 6       | 4    | 6    | 47.3  | 65    | 77    | 89      | 5    | 6         | 44.0    | 5                                  | 12      | 5    | 12 | 2 |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 13               | 10 | 8  | 8  | 5             | 6.5  | 4       | 7.5  | 45.3 | 29.0  | 29.0  | 29.0  | 5       | 16   | 89.5 | 5       | 16               | 27.5 | 4       | 6    | 4       | 7.5  | 44.5 | 66    | 78    | 90    | 5       | 6.5  | 44.0      | 5       | 12                                 | 5       | 12   | 12 |   |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 13               | 10 | 8  | 8  | 5             | 6.5  | 5       | 6.5  | 45.3 | 29.0  | 29.0  | 29.0  | 5       | 15   | 89.5 | 5       | 15               | 28.5 | 5       | 8    | 4       | 6    | 44.5 | 66    | 78    | 90    | 6       | 6.5  | 46.0      | 5       | 11                                 | 5       | 12   | 12 |   |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 9                | 9  | 8  | 8  | 5             | 8.5  | 5       | 6.5  | 42.1 | 25.0  | 25.0  | 25.0  | 5       | 15   | 59.0 | 5       | 15               | 28.5 | 5       | 8    | 4       | 6    | 39.5 | 65    | 77    | 89    | 6       | 6.5  | 46.0      | 5       | 11                                 | 5       | 12   | 12 |   |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 9                | 9  | 8  | 8  | 5             | 8.5  | 5       | 6.5  | 36.9 | 25.0  | 25.0  | 29.0  | 5       | 14   | 47.0 | 5       | 14               | 27.5 | 5       | 7.5  | 5       | 7    | 36.5 | 65    | 77    | 89    | 6       | 6    | 45.0      | 5       | 12                                 | 5       | 12   | 12 |   |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 9                | 10 | 8  | 8  | 5             | 8.5  | 5       | 6.5  | 35.6 | 25.0  | 25.0  | 25.0  | 5       | 12   | 44.0 | 5       | 12               | 27.0 | 5       | 7.5  | 4       | 6.5  | 34.6 | 66    | 78    | 90    | 6       | 6.5  | 45.0      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 10               | 11 | 8  | 8  | 5             | 8    | 5       | 7.5  | 34.3 | 26.0  | 26.0  | 26.0  | 5       | 12   | 43.0 | 5       | 12               | 26.5 | 5       | 7.5  | 4       | 6.5  | 33.3 | 67    | 79    | 91    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 11               | 12 | 8  | 8  | 5             | 7.5  | 5       | 8.5  | 33.0 | 27.0  | 27.0  | 27.0  | 5       | 12   | 42.5 | 5       | 12               | 26.5 | 5       | 7    | 4       | 6    | 32.1 | 68    | 80    | 92    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 12               | 13 | 8  | 8  | 5             | 7    | 5       | 8.5  | 32.1 | 28.0  | 28.0  | 28.0  | 5       | 12   | 42.0 | 5       | 12               | 26.5 | 5       | 6.5  | 4       | 6    | 31.5 | 69    | 81    | 93    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 13               | 14 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 31.5 | 29.0  | 29.0  | 33.0  | 6       | 16   | 44.5 | 6       | 16               | 29.5 | 5       | 6.5  | 5       | 8.5  | 31.0 | 70    | 82    | 94    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 13               | 15 | 8  | 8  | 5             | 6.5  | 5       | 8    | 31.3 | 29.0  | 29.0  | 33.0  | 6       | 15   | 44.5 | 6       | 15               | 29.5 | 5       | 6.5  | 5       | 8.5  | 30.5 | 71    | 83    | 95    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 14               | 15 | 8  | 8  | 5             | 6    | 5       | 8.5  | 29.3 | 30.0  | 30.0  | 34.0  | 6       | 16   | 43.5 | 6       | 16               | 29.0 | 5       | 6    | 5       | 8.5  | 29.1 | 71    | 83    | 95    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 15               | 16 | 8  | 8  | 5             | 6    | 5       | 8    | 34.1 | 31.0  | 31.0  | 35.0  | 6       | 15   | 49.5 | 6       | 15               | 35.0 | 5       | 6    | 5       | 8    | 29.1 | 72    | 84    | 96    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 15               | 17 | 8  | 8  | 6             | 7.5  | 5       | 8    | 34.3 | 31.0  | 31.0  | 35.0  | 6       | 14   | 49.5 | 6       | 14               | 35.0 | 5       | 6    | 5       | 7    | 28.9 | 73    | 85    | 97    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 12   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 16               | 18 | 8  | 8  | 6             | 8    | 5       | 7    | 34.1 | 32.0  | 36.0  | 36.0  | 6       | 14   | 49.0 | 6       | 14               | 35.0 | 5       | 6    | 5       | 6.5  | 29.0 | 74    | 86    | 98    | 6       | 6.5  | 44.5      | 5       | 12                                 | 5       | 11   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 17               | 19 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 34.0 | 37.0  | 37.0  | 37.0  | 6       | 14   | 49.0 | 6       | 14               | 35.0 | 5       | 6    | 5       | 6.5  | 29.1 | 75    | 87    | 99    | 6       | 6    | 44.5      | 5       | 12                                 | 5       | 10   | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 18               | 20 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 34.0 | 38.0  | 38.0  | 38.0  | 6       | 13   | 48.5 | 6       | 13               | 34.0 | 6       | 8.5  | 5       | 6    | 29.3 | 76    | 88    | 100   | 6       | 6    | 44.5      | 5       | 12                                 | 5       | 9.5  | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 19               | 21 | 8  | 8  | 6             | 7.5  | 5       | 6    | 34.1 | 39.0  | 39.0  | 39.0  | 6       | 13   | 48.0 | 6       | 13               | 33.0 | 6       | 8.5  | 6       | 7.5  | 32.5 | 77    | 89    | 101   | 7       | 7.5  | 47.0      | 5       | 12                                 | 5       | 9.5  | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 20               | 21 | 8  | 8  | 6             | 7.5  | 6       | 7.5  | 38.0 | 44.0  | 44.0  | 44.0  | 6       | 12   | 47.5 | 6       | 12               | 32.5 | 6       | 7.5  | 6       | 7.5  | 32.6 | 77    | 89    | 101   | 7       | 7.5  | 47.0      | 5       | 12                                 | 5       | 9.5  | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 20               | 22 | 8  | 8  | 6             | 7    | 6       | 7.5  | 38.0 | 44.0  | 44.0  | 44.0  | 6       | 12   | 47.5 | 6       | 12               | 33.0 | 6       | 8    | 6       | 7    | 32.6 | 78    | 90    | 102   | 7       | 7.5  | 47.0      | 5       | 12                                 | 5       | 9.5  | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 21               | 23 | 8  | 8  | 6             | 7    | 6       | 7    | 38.1 | 45.0  | 45.0  | 45.0  | 6       | 12   | 47.0 | 6       | 12               | 32.0 | 6       | 7.5  | 6       | 6.5  | 32.8 | 79    | 91    | 103   | 7       | 7    | 47.0      | 5       | 12                                 | 5       | 9    | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 22               | 24 | 8  | 8  | 6             | 6.5  | 6       | 6.5  | 38.3 | 46.0  | 46.0  | 46.0  | 7       | 15   | 51.5 | 7       | 15               | 36.0 | 6       | 7.5  | 6       | 6    | 33.0 | 80    | 92    | 104   | 7       | 7    | 47.0      | 5       | 12                                 | 5       | 8    | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 22               | 24 | 8  | 8  | 6             | 6.5  | 6       | 6    | 38.1 | 46.0  | 46.0  | 46.0  | 7       | 15   | 51.5 | 7       | 15               | 36.5 | 6       | 7.5  | 6       | 6    | 33.0 | 80    | 92    | 104   | 7       | 7    | 47.0      | 5       | 12                                 | 5       | 7.5  | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 23               | 25 | 9  | 8  | 6             | 6.5  | 6       | 7    | 39.0 | 47.0  | 47.0  | 47.0  | 7       | 15   | 50.5 | 7       | 15               | 36.0 | 6       | 7.5  | 6       | 7    | 33.5 | 81    | 93    | 105   | 7       | 7    | 47.0      | 5       | 12                                 | 5       | 8.5  | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 24               | 26 | 9  | 8  | 6             | 6    | 6       | 7    | 39.0 | 48.0  | 48.0  | 48.0  | 7       | 15   | 49.5 | 7       | 15               | 35.5 | 6       | 7.5  | 6       | 6.5  | 33.8 | 82    | 94    | 106   | 7       | 7    | 47.0      | 5       | 12                                 | 5       | 8    | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 24               | 26 | 9  | 8  | 6             | 6    | 6       | 7    | 39.0 | 48.0  | 48.0  | 48.0  | 7       | 15   | 49.5 | 7       | 15               | 35.5 | 6       | 6.5  | 6       | 6.5  | 33.8 | 82    | 94    | 106   | 7       | 6.5  | 47.0      | 5       | 12                                 | 5       | 8    | 0  |   |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 25               | 27 | 9  | 8  | 6             | 6    | 6       | 6.5  | 39.0 | 49.0  | 49.0  | 49.0  | 7       | 15   | 49.0 | 7       | 15               | 35.5 | 6       | 7    | 6       | 6.5  | 34.0 | 83    | 95    | 107   | 7       | 6.5  | 47.0      | 5       | 12                                 | 5       | 7.5  | 0  |   |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 9 FT |                  |      |      |      |               |     |         |       |       |        |      |      |         |    |         |      |                  |      |         |       |        |      |      |      |         |      |         | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |           |   |    |   |      |    |  |  |  |  |  |
|-----------------|------------------|------|------|------|---------------|-----|---------|-------|-------|--------|------|------|---------|----|---------|------|------------------|------|---------|-------|--------|------|------|------|---------|------|---------|-------------------------------------|-----------|---|----|---|------|----|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |     |         |       |       |        |      |      |         |    |         |      | BOTTOM SLAB BARS |      |         |       |        |      |      |      |         |      |         |                                     | WALL BARS |   |    |   |      |    |  |  |  |  |  |
|                 |                  |      |      |      | A1 BARS       |     | J3 BARS |       |       |        |      |      | H1 BARS |    | H2 BARS |      | A2 BARS          |      | J4 BARS |       |        |      |      |      | H3 BARS |      | B1 BARS |                                     | B2 BARS   |   |    |   |      |    |  |  |  |  |  |
|                 | SIZE             | SPA. | SIZE | SPA. | C1            | K2  |         |       | SIZE  | SPA.   | C5   | SIZE | SPA.    | C6 | SIZE    | SPA. | C4               | K3   |         |       | SIZE   | SPA. | C7   | SIZE | SPA.    | SIZE | SPA.    | G1                                  |           |   |    |   |      |    |  |  |  |  |  |
|                 | TS               | BS   | TX   | TI   |               |     |         | HT=8' | HT=9' | HT=10' |      |      |         |    |         |      |                  |      | HT=8'   | HT=9' | HT=10' |      |      |      |         |      |         |                                     |           |   |    |   |      |    |  |  |  |  |  |
| 1 FT            | 13               | 10   | 8    | 8    | 5             | 6.5 | 5       | 8.5   | 47.3  | 29.0   | 29.0 | 33.0 | 5       | 18 | 91.5    | 5    | 18               | 29.0 | 4       | 6     | 5      | 6    | 69.0 | 102  | 114     | 126  | 5       | 6.5                                 | 44.5      | 5 | 12 | 5 | 12   | 12 |  |  |  |  |  |
| 2 FT            | 13               | 10   | 8    | 8    | 5             | 6.5 | 5       | 8.5   | 47.3  | 29.0   | 29.0 | 33.0 | 5       | 17 | 91.5    | 5    | 17               | 28.0 | 5       | 9     | 6      | 7    | 66.6 | 102  | 114     | 126  | 5       | 6                                   | 44.0      | 5 | 12 | 5 | 12   | 12 |  |  |  |  |  |
| 2' - 4'         | 13               | 10   | 8    | 8    | 5             | 6.5 | 6       | 7     | 47.3  | 29.0   | 33.0 | 33.0 | 5       | 15 | 91.5    | 5    | 15               | 29.0 | 5       | 7.5   | 6      | 6    | 66.6 | 102  | 114     | 126  | 6       | 6                                   | 46.0      | 5 | 12 | 5 | 10.5 | 12 |  |  |  |  |  |
| 4 FT            | 9                | 9    | 8    | 8    | 5             | 8.5 | 6       | 7     | 47.3  | 29.0   | 33.0 | 33.0 | 5       | 15 | 91.5    | 5    | 15               | 29.0 | 5       | 7.5   | 6      | 6    | 59.4 | 101  | 113     | 125  | 6       | 6                                   | 46.0      | 5 | 12 | 5 | 10.5 | 12 |  |  |  |  |  |
| 6 FT            | 9                | 10   | 9    | 8    | 5             | 8.5 | 5       | 6     | 54.1  | 25.0   | 25.0 | 29.0 | 5       | 14 | 48.0    | 5    | 14               | 27.5 | 5       | 8     | 5      | 6    | 51.8 | 102  | 114     | 126  | 6       | 6.5                                 | 45.5      | 5 | 12 | 5 | 11.5 | 12 |  |  |  |  |  |
| 8 FT            | 9                | 11   | 9    | 8    | 5             | 8.5 | 5       | 6     | 48.0  | 25.0   | 29.0 | 29.0 | 5       | 13 | 44.0    | 5    | 13               | 27.0 | 5       | 8     | 5      | 6    | 49.3 | 103  | 115     | 127  | 6       | 7                                   | 45.0      | 5 | 12 | 5 | 11   | 0  |  |  |  |  |  |
| 10 FT           | 10               | 11   | 9    | 8    | 5             | 8   | 5       | 6     | 46.6  | 26.0   | 30.0 | 30.0 | 5       | 12 | 43.0    | 5    | 12               | 26.5 | 5       | 7     | 6      | 7    | 50.0 | 103  | 115     | 127  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 10   | 0  |  |  |  |  |  |
| 12 FT           | 11               | 12   | 9    | 8    | 5             | 7.5 | 6       | 7     | 48.4  | 31.0   | 31.0 | 35.0 | 5       | 12 | 42.0    | 5    | 12               | 26.5 | 5       | 7     | 6      | 7    | 49.0 | 104  | 116     | 128  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 9.5  | 0  |  |  |  |  |  |
| 14 FT           | 12               | 13   | 9    | 8    | 5             | 7   | 6       | 7.5   | 47.4  | 32.0   | 32.0 | 36.0 | 5       | 12 | 41.5    | 5    | 12               | 26.5 | 5       | 6.5   | 6      | 7    | 48.1 | 105  | 117     | 129  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 8.5  | 0  |  |  |  |  |  |
| 16 FT           | 12               | 14   | 9    | 8    | 5             | 7   | 6       | 6.5   | 46.4  | 32.0   | 32.0 | 36.0 | 6       | 15 | 44.5    | 6    | 15               | 29.5 | 5       | 6.5   | 6      | 7    | 47.5 | 106  | 118     | 130  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 8.5  | 0  |  |  |  |  |  |
| 18 FT           | 13               | 15   | 9    | 8    | 5             | 6.5 | 6       | 6.5   | 46.0  | 33.0   | 33.0 | 37.0 | 6       | 15 | 44.0    | 6    | 15               | 29.0 | 5       | 6.5   | 6      | 7.5  | 47.3 | 107  | 119     | 131  | 6       | 7                                   | 44.5      | 5 | 12 | 5 | 8.5  | 0  |  |  |  |  |  |
| 20 FT           | 14               | 15   | 9    | 8    | 5             | 6.5 | 5       | 6     | 40.1  | 34.0   | 34.0 | 34.0 | 6       | 16 | 43.0    | 6    | 16               | 29.0 | 5       | 6     | 6      | 7.5  | 44.4 | 107  | 119     | 131  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 8.5  | 0  |  |  |  |  |  |
| 22 FT           | 14               | 16   | 10   | 8    | 5             | 6   | 5       | 6     | 40.5  | 34.0   | 34.0 | 34.0 | 6       | 15 | 43.0    | 6    | 15               | 29.0 | 5       | 6     | 5      | 7    | 41.5 | 108  | 120     | 132  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 8    | 0  |  |  |  |  |  |
| 24 FT           | 15               | 17   | 10   | 8    | 6             | 6   | 8       | 6     | 49.5  | 35.0   | 35.0 | 35.0 | 6       | 15 | 48.5    | 6    | 15               | 35.0 | 5       | 6     | 5      | 6.5  | 41.6 | 109  | 121     | 133  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 8    | 0  |  |  |  |  |  |
| 26 FT           | 16               | 18   | 11   | 8    | 6             | 8   | 5       | 6     | 46.1  | 36.0   | 36.0 | 36.0 | 6       | 15 | 48.0    | 6    | 15               | 34.5 | 5       | 6     | 5      | 7    | 41.9 | 110  | 122     | 134  | 6       | 6.5                                 | 44.5      | 5 | 12 | 5 | 7.5  | 0  |  |  |  |  |  |
| 28 FT           | 17               | 19   | 11   | 8    | 6             | 8   | 6       | 8     | 50.1  | 37.0   | 37.0 | 37.0 | 6       | 14 | 47.5    | 6    | 14               | 33.5 | 5       | 6     | 5      | 7    | 42.0 | 111  | 123     | 135  | 6       | 6                                   | 44.5      | 5 | 12 | 5 | 7.5  | 0  |  |  |  |  |  |
| 30 FT           | 18               | 20   | 12   | 8    | 6             | 8   | 5       | 6     | 46.8  | 38.0   | 38.0 | 38.0 | 6       | 13 | 47.0    | 6    | 13               | 32.5 | 6       | 8.5   | 5      | 6.5  | 42.4 | 112  | 124     | 136  | 6       | 6                                   | 44.5      | 5 | 12 | 5 | 7.5  | 0  |  |  |  |  |  |
| 32 FT           | 18               | 21   | 12   | 8    | 6             | 7.5 | 6       | 8     | 50.8  | 38.0   | 38.0 | 38.0 | 6       | 13 | 47.0    | 6    | 13               | 33.5 | 6       | 8     | 5      | 6.5  | 42.5 | 113  | 125     | 137  | 7       | 7.5                                 | 47.5      | 5 | 12 | 5 | 7    | 0  |  |  |  |  |  |
| 34 FT           | 19               | 22   | 12   | 8    | 6             | 7   | 6       | 7.5   | 50.9  | 39.0   | 39.0 | 39.0 | 6       | 13 | 46.0    | 6    | 13               | 32.5 | 6       | 8     | 5      | 6.5  | 42.8 | 114  | 126     | 138  | 7       | 7.5                                 | 47.5      | 5 | 12 | 5 | 7    | 0  |  |  |  |  |  |
| 36 FT           | 20               | 23   | 13   | 8    | 6             | 7   | 6       | 8     | 51.5  | 40.0   | 40.0 | 40.0 | 6       | 12 | 45.0    | 6    | 12               | 31.5 | 6       | 8     | 5      | 6    | 43.1 | 115  | 127     | 139  | 7       | 7                                   | 47.5      | 5 | 12 | 5 | 6.5  | 0  |  |  |  |  |  |
| 38 FT           | 20               | 23   | 13   | 8    | 6             | 6.5 | 6       | 7.5   | 51.4  | 40.0   | 40.0 | 40.0 | 6       | 12 | 45.0    | 6    | 12               | 32.0 | 6       | 7.5   | 5      | 6    | 43.0 | 115  | 127     | 139  | 7       | 7                                   | 47.5      | 5 | 12 | 5 | 6.5  | 0  |  |  |  |  |  |
| 40 FT           | 21               | 24   | 13   | 8    | 6             | 6.5 | 6       | 7     | 51.5  | 41.0   | 41.0 | 41.0 | 6       | 12 | 44.5    | 6    | 12               | 31.0 | 6       | 7.5   | 5      | 6    | 43.3 | 116  | 128     | 140  | 7       | 7                                   | 47.5      | 5 | 12 | 5 | 6.5  | 0  |  |  |  |  |  |
| 42 FT           | 21               | 25   | 14   | 8    | 6             | 6   | 6       | 7.5   | 52.3  | 41.0   | 41.0 | 41.0 | 6       | 12 | 44.5    | 6    | 12               | 31.5 | 6       | 7.5   | 5      | 6    | 43.5 | 117  | 129     | 141  | 7       | 7                                   | 47.5      | 5 | 12 | 5 | 6    | 0  |  |  |  |  |  |
| 44 FT           | 22               | 25   | 14   | 8    | 6             | 6.5 | 6       | 7     | 52.1  | 42.0   | 42.0 | 42.0 | 7       | 16 | 49.0    | 7    | 16               | 35.5 | 6       | 6.5   | 5      | 6    | 43.6 | 117  | 129     | 141  | 7       | 6.5                                 | 47.5      | 5 | 12 | 5 | 6    | 0  |  |  |  |  |  |
| 46 FT           | 23               | 26   | 14   | 8    | 6             | 6   | 6       | 7     | 52.1  | 43.0   | 43.0 | 43.0 | 6       | 12 | 43.5    | 6    | 12               | 30.5 | 6       | 7     | 5      | 6    | 43.9 | 118  | 130     | 142  | 7       | 6.5                                 | 47.5      | 5 | 12 | 5 | 6    | 0  |  |  |  |  |  |
| 48 FT           | 23               | 27   | 15   | 8    | 6             | 6   | 6       | 7     | 53.0  | 43.0   | 43.0 | 47.0 | 6       | 12 | 43.5    | 6    | 12               | 30.0 | 6       | 7     | 6      | 8.5  | 47.1 | 119  | 131     | 143  | 7       | 6.5                                 | 47.5      | 5 | 12 | 5 | 6    | 0  |  |  |  |  |  |
| 50 FT           | 24               | 28   | 15   | 8    | 6             | 6   | 6       | 7     | 53.0  | 44.0   | 44.0 | 48.0 | 6       | 12 | 43.0    | 6    | 12               | 30.0 | 6       | 7     | 6      | 8    | 47.5 | 120  | 132     | 144  | 7       | 6.5                                 | 47.5      | 5 | 12 | 6 | 8    | 0  |  |  |  |  |  |

| SPAN (S) = 9 FT |                     |      |      |      |               |                    |         |      |      |      |         |      |         |      |         |      |                  |                    |     |      |         |      |         |     |         |     |      | HEIGHT (HT) = 11 FT OR 12 FT |           |      |      |      |      |    |  |  |  |
|-----------------|---------------------|------|------|------|---------------|--------------------|---------|------|------|------|---------|------|---------|------|---------|------|------------------|--------------------|-----|------|---------|------|---------|-----|---------|-----|------|------------------------------|-----------|------|------|------|------|----|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |                    |         |      |      |      |         |      |         |      |         |      | BOTTOM SLAB BARS |                    |     |      |         |      |         |     |         |     |      |                              | WALL BARS |      |      |      |      |    |  |  |  |
|                 |                     |      |      |      | A1 BARS       |                    | J3 BARS |      |      |      | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |                    |     |      | H3 BARS |      | B1 BARS |     | B2 BARS |     |      |                              |           |      |      |      |      |    |  |  |  |
|                 | SIZE                | SPA. | SIZE | SPA. | C1            | K2<br>HT=11'HT=12' |         | SIZE | SPA. | C5   |         |      |         |      | SIZE    | SPA. | C4               | K3<br>HT=11'HT=12' |     | SIZE |         |      |         |     |         |     |      | SPA.                         | C7        | SIZE | SPA. | SIZE | SPA. | G1 |  |  |  |
|                 | 1 FT                | 13   | 10   | 9    | 10            | 5                  | 6.5     | 5    | 8    | 48.3 | 33.0    | 33.0 | 5       | 17   | 93.0    | 5    | 17               | 29.0               | 5   | 9    | 6       | 6.5  | 79.4    | 138 | 150     | 5   | 6    | 44.5                         | 5         | 12   | 5    | 9.5  | 1    |    |  |  |  |
| 2 FT            | 13                  | 11   | 9    | 10   | 5             | 6.5                | 5       | 7.5  | 48.3 | 33.0 | 33.0    | 5    | 16      | 93.0 | 5       | 16   | 28.0             | 4                  | 6   | 6    | 7       | 77.0 | 139     | 151 | 5       | 6   | 44.5 | 5                            | 12        | 5    | 9    | 12   |      |    |  |  |  |
| 2'- 4'          | 13                  | 11   | 9    | 10   | 5             | 6.5                | 5       | 6    | 48.3 | 33.0 | 33.0    | 5    | 15      | 93.0 | 5       | 15   | 29.0             | 5                  | 8   | 6    | 6       | 77.0 | 139     | 151 | 6       | 7   | 46.5 | 5                            | 12        | 5    | 8.5  | 12   |      |    |  |  |  |
| 4 FT            | 9                   | 10   | 9    | 10   | 5             | 8.5                | 5       | 6    | 48.3 | 29.0 | 29.0    | 5    | 15      | 93.0 | 5       | 15   | 29.0             | 5                  | 8   | 6    | 6       | 71.4 | 138     | 150 | 6       | 7   | 46.5 | 5                            | 12        | 5    | 8.5  | 12   |      |    |  |  |  |
| 6 FT            | 9                   | 11   | 9    | 10   | 5             | 8.5                | 6       | 7    | 69.3 | 29.0 | 33.0    | 5    | 15      | 47.0 | 5       | 15   | 28.0             | 5                  | 8.5 | 6    | 6       | 68.0 | 139     | 151 | 5       | 6   | 43.0 | 5                            | 12        | 5    | 8.5  | 12   |      |    |  |  |  |
| 8 FT            | 9                   | 11   | 9    | 10   | 5             | 8.5                | 6       | 6.5  | 61.6 | 29.0 | 33.0    | 5    | 13      | 44.0 | 5       | 13   | 27.5             | 5                  | 7.5 | 6    | 6       | 63.8 | 139     | 151 | 6       | 7   | 45.5 | 5                            | 12        | 5    | 8.5  | 0    |      |    |  |  |  |
| 10 FT           | 10                  | 11   | 10   | 10   | 5             | 8                  | 5       | 6    | 56.4 | 30.0 | 30.0    | 5    | 13      | 43.0 | 5       | 13   | 27.5             | 5                  | 7   | 6    | 6       | 60.1 | 139     | 151 | 6       | 6.5 | 45.0 | 5                            | 12        | 5    | 8    | 0    |      |    |  |  |  |
| 12 FT           | 11                  | 12   | 10   | 10   | 5             | 7.5                | 5       | 6    | 55.0 | 31.0 | 31.0    | 5    | 13      | 42.5 | 5       | 13   | 27.0             | 5                  | 6.5 | 6    | 6.5     | 59.1 | 140     | 152 | 6       | 6.5 | 45.0 | 5                            | 12        | 5    | 8    | 0    |      |    |  |  |  |
| 14 FT           | 11                  | 13   | 10   | 10   | 5             | 7.5                | 6       | 7    | 55.6 | 31.0 | 35.0    | 6    | 16      | 45.0 | 6       | 16   | 30.0             | 5                  | 6.5 | 6    | 6.5     | 58.5 | 141     | 153 | 6       | 6.5 | 45.0 | 5                            | 12        | 5    | 8    | 0    |      |    |  |  |  |
| 16 FT           | 12                  | 14   | 11   | 10   | 5             | 7                  | 6       | 8.5  | 54.6 | 32.0 | 36.0    | 6    | 16      | 44.5 | 6       | 16   | 30.0             | 5                  | 6.5 | 6    | 7       | 57.4 | 142     | 154 | 6       | 6.5 | 45.0 | 5                            | 12        | 5    | 7.5  | 0    |      |    |  |  |  |
| 18 FT           | 13                  | 15   | 11   | 10   | 5             | 6.5                | 6       | 7.5  | 54.6 | 33.0 | 37.0    | 6    | 16      | 44.0 | 6       | 16   | 30.0             | 5                  | 6.5 | 6    | 6.5     | 57.1 | 143     | 155 | 6       | 7   | 44.5 | 5                            | 12        | 5    | 7.5  | 0    |      |    |  |  |  |
| 20 FT           | 13                  | 15   | 11   | 10   | 5             | 6.5                | 6       | 7.5  | 51.5 | 33.0 | 37.0    | 6    | 15      | 43.5 | 6       | 15   | 29.5             | 5                  | 6   | 6    | 6.5     | 53.4 | 143     | 155 | 6       | 6.5 | 44.5 | 5                            | 12        | 5    | 7.5  | 0    |      |    |  |  |  |
| 22 FT           | 14                  | 16   | 12   | 10   | 5             | 6                  | 6       | 8    | 51.9 | 34.0 | 38.0    | 6    | 16      | 43.0 | 6       | 16   | 29.5             | 5                  | 6   | 6    | 7.5     | 53.6 | 144     | 156 | 6       | 6.5 | 44.5 | 5                            | 12        | 5    | 7    | 0    |      |    |  |  |  |
| 24 FT           | 15                  | 17   | 12   | 10   | 5             | 6                  | 6       | 7.5  | 58.0 | 35.0 | 39.0    | 6    | 16      | 48.5 | 6       | 16   | 35.5             | 5                  | 6   | 6    | 7.5     | 53.8 | 145     | 157 | 6       | 6.5 | 44.5 | 5                            | 12        | 5    | 7    | 0    |      |    |  |  |  |
| 26 FT           | 16                  | 18   | 13   | 10   | 6             | 8.5                | 6       | 7.5  | 58.5 | 36.0 | 40.0    | 6    | 15      | 48.0 | 6       | 15   | 34.5             | 5                  | 6   | 6    | 8       | 54.0 | 146     | 158 | 6       | 6.5 | 44.5 | 5                            | 12        | 5    | 6.5  | 0    |      |    |  |  |  |
| 28 FT           | 17                  | 19   | 13   | 10   | 6             | 8                  | 6       | 7    | 58.6 | 37.0 | 41.0    | 6    | 14      | 47.5 | 6       | 14   | 33.5             | 6                  | 8.5 | 6    | 8       | 54.1 | 147     | 159 | 6       | 6   | 44.5 | 5                            | 12        | 5    | 6.5  | 0    |      |    |  |  |  |
| 30 FT           | 17                  | 20   | 13   | 10   | 6             | 7.5                | 6       | 6.5  | 58.5 | 37.0 | 41.0    | 6    | 14      | 47.5 | 6       | 14   | 34.5             | 6                  | 8   | 6    | 7       | 54.4 | 148     | 160 | 6       | 6   | 44.5 | 5                            | 12        | 5    | 6.5  | 0    |      |    |  |  |  |
| 32 FT           | 18                  | 21   | 14   | 10   | 6             | 7.5                | 6       | 7    | 59.1 | 38.0 | 42.0    | 6    | 13      | 47.0 | 6       | 13   | 33.5             | 6                  | 8   | 6    | 8       | 54.6 | 149     | 161 | 7       | 7.5 | 47.5 | 5                            | 12        | 5    | 6    | 0    |      |    |  |  |  |
| 34 FT           | 19                  | 22   | 14   | 10   | 6             | 7.5                | 6       | 6.5  | 59.3 | 39.0 | 43.0    | 6    | 13      | 46.5 | 6       | 13   | 32.5             | 6                  | 8   | 6    | 8       | 54.9 | 150     | 162 | 7       | 7.5 | 47.5 | 5                            | 12        | 5    | 6    | 0    |      |    |  |  |  |
| 36 FT           | 19                  | 22   | 15   | 10   | 6             | 7                  | 6       | 6.5  | 59.5 | 43.0 | 43.0    | 6    | 13      | 46.0 | 6       | 13   | 33.0             | 6                  | 7   | 6    | 8       | 54.9 | 150     | 162 | 7       | 7.5 | 48.0 | 5                            | 12        | 6    | 8    | 0    |      |    |  |  |  |
| 38 FT           | 20                  | 23   | 15   | 10   | 6             | 7                  | 6       | 6.5  | 59.6 | 44.0 | 44.0    | 6    | 12      | 45.5 | 6       | 12   | 32.0             | 6                  | 7.5 | 6    | 8       | 55.1 | 151     | 163 | 7       | 7   | 47.5 | 5                            | 12        | 6    | 8    | 0    |      |    |  |  |  |
| 40 FT           | 20                  | 24   | 16   | 10   | 6             | 6                  | 6       | 6.5  | 60.0 | 44.0 | 44.0    | 6    | 12      | 45.0 | 6       | 12   | 32.5             | 6                  | 7.5 | 6    | 7.5     | 55.5 | 152     | 164 | 7       | 7   | 48.0 | 5                            | 12        | 6    | 8    | 0    |      |    |  |  |  |
| 42 FT           | 21                  | 25   | 16   | 10   | 6             | 6.5                | 6       | 6    | 60.3 | 45.0 | 45.0    | 6    | 12      | 44.5 | 6       | 12   | 31.5             | 6                  | 7.5 | 6    | 7.5     | 55.8 | 153     | 165 | 7       | 7   | 48.0 | 5                            | 12        | 6    | 8    | 0    |      |    |  |  |  |
| 44 FT           | 22                  | 25   | 17   | 10   | 6             | 6.5                | 6       | 6.5  | 60.8 | 46.0 | 46.0    | 6    | 12      | 44.0 | 6       | 12   | 31.0             | 6                  | 6.5 | 6    | 7       | 55.9 | 153     | 165 | 7       | 6.5 | 48.0 | 5                            | 12        | 6    | 7.5  | 0    |      |    |  |  |  |
| 46 FT           | 22                  | 26   | 17   | 10   | 6             | 6                  | 6       | 6    | 60.8 | 46.0 | 46.0    | 6    | 12      | 44.0 | 6       | 12   | 31.0             | 6                  | 7   | 6    | 7       | 56.1 | 154     | 166 | 7       | 6.5 | 48.0 | 5                            | 12        | 6    | 7.5  | 0    |      |    |  |  |  |
| 48 FT           | 23                  | 27   | 18   | 10   | 6             | 6                  | 6       | 6.5  | 61.5 | 47.0 | 47.0    | 6    | 12      | 43.5 | 6       | 12   | 31.0             | 6                  | 7   | 6    | 6.5     | 56.6 | 155     | 167 | 7       | 6.5 | 48.0 | 5                            | 12        | 6    | 7    | 0    |      |    |  |  |  |
| 50 FT           | 23                  | 28   | 19   | 10   | 6             | 6                  | 6       | 6.5  | 62.0 | 43.0 | 47.0    | 6    | 12      | 43.5 | 6       | 12   | 31.0             | 6                  | 7   | 6    | 7       | 57.0 | 156     | 168 | 7       | 6.5 | 48.0 | 5                            | 12        | 6    | 7    | 0    |      |    |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 9 FEET  
HEIGHT (HT): 11 THRU 12 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
13 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

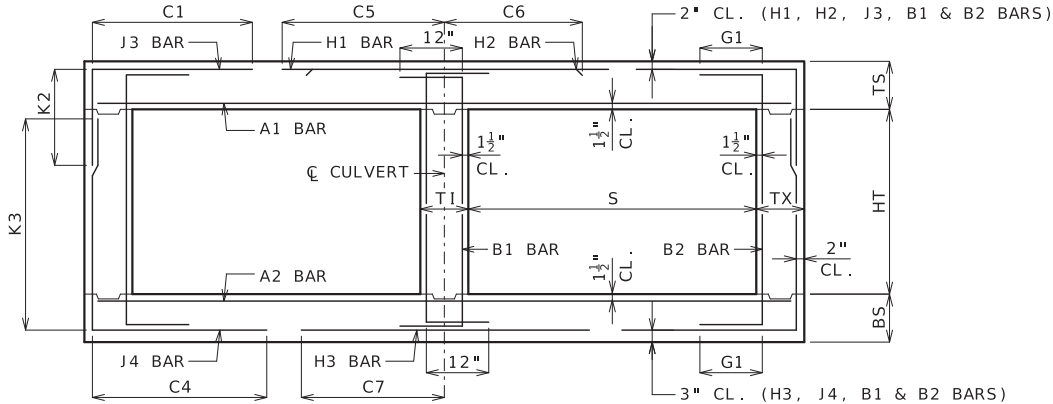


| SPAN (S) = 10 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |      |         |                  |      |         |      |         |       |       |       |      |      |         |      |           |         |      | HEIGHT (HT) = 5 FT OR 6 FT OR 7 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------|---------|------------------|------|---------|------|---------|-------|-------|-------|------|------|---------|------|-----------|---------|------|------------------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |      |         | BOTTOM SLAB BARS |      |         |      |         |       |       |       |      |      |         |      | WALL BARS |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |      | H2 BARS |                  |      | A2 BARS |      | J4 BARS |       |       |       |      |      | H3 BARS |      |           | B1 BARS |      | B2 BARS                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5   | SIZE    | SPA.             | C6   | SIZE    | SPA. | C4      | K3    |       |       | SIZE | SPA. | C7      | SIZE | SPA.      | SIZE    | SPA. | G1                                 |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=5' | HT=6' | HT=7' |         |      |      |         |                  |      |         |      |         | HT=5' | HT=6' | HT=7' |      |      |         |      |           |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 13               | 10 | 8  | 8  | 5             | 6.5  | 4       | 7    | 48.9 | 29.0  | 29.0  | 29.0  | 5       | 15   | 98.0 | 5       | 15               | 29.0 | 4       | 6    | 4       | 7     | 48.1  | 66    | 78   | 90   | 5       | 6    | 47.5      | 5       | 12   | 5                                  | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 13               | 10 | 8  | 8  | 5             | 6.5  | 4       | 7    | 48.9 | 29.0  | 29.0  | 29.0  | 5       | 13   | 98.0 | 5       | 13               | 28.5 | 5       | 8.5  | 4       | 6.5   | 43.8  | 66    | 78   | 90   | 6       | 7    | 50.0      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 13               | 10 | 8  | 8  | 5             | 6.5  | 6       | 7.5  | 48.9 | 29.0  | 29.0  | 29.0  | 5       | 12   | 98.0 | 5       | 12               | 30.0 | 5       | 8    | 4       | 6.5   | 43.8  | 66    | 78   | 90   | 6       | 6.5  | 50.0      | 5       | 8.5  | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 9                | 10 | 8  | 8  | 5             | 7.5  | 6       | 7.5  | 43.1 | 25.0  | 25.0  | 25.0  | 5       | 12   | 62.0 | 5       | 12               | 30.0 | 5       | 8    | 4       | 7     | 38.9  | 66    | 78   | 90   | 6       | 6.5  | 49.5      | 5       | 8.5  | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 9                | 10 | 8  | 8  | 5             | 8.5  | 5       | 6    | 38.0 | 25.0  | 25.0  | 25.0  | 6       | 15   | 53.5 | 6       | 15               | 32.0 | 5       | 7    | 4       | 6.5   | 36.1  | 66    | 78   | 90   | 6       | 6    | 48.5      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 10               | 11 | 8  | 8  | 5             | 8    | 5       | 7.5  | 36.0 | 26.0  | 26.0  | 26.0  | 6       | 16   | 51.0 | 6       | 16               | 31.5 | 5       | 7    | 4       | 6.5   | 34.1  | 67    | 79   | 91   | 6       | 6    | 48.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 11               | 12 | 8  | 8  | 5             | 7.5  | 5       | 8    | 34.1 | 27.0  | 27.0  | 27.0  | 6       | 15   | 49.5 | 6       | 15               | 31.0 | 5       | 6.5  | 4       | 6     | 32.6  | 68    | 80   | 92   | 6       | 6.5  | 48.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 12               | 13 | 8  | 8  | 5             | 7    | 5       | 8.5  | 32.8 | 28.0  | 28.0  | 28.0  | 6       | 15   | 48.5 | 6       | 15               | 31.0 | 5       | 6.5  | 4       | 6     | 31.5  | 69    | 81   | 93   | 6       | 6.5  | 48.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 13               | 14 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 31.6 | 29.0  | 29.0  | 33.0  | 6       | 15   | 48.5 | 6       | 15               | 31.0 | 5       | 6    | 5       | 9     | 30.8  | 70    | 82   | 94   | 6       | 6    | 47.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 14               | 15 | 8  | 8  | 5             | 6    | 5       | 8.5  | 30.8 | 30.0  | 30.0  | 34.0  | 6       | 14   | 48.0 | 6       | 14               | 31.0 | 5       | 6    | 5       | 8.5   | 30.1  | 71    | 83   | 95   | 6       | 6    | 47.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 15               | 16 | 8  | 8  | 6             | 8    | 5       | 8    | 35.1 | 31.0  | 31.0  | 35.0  | 6       | 14   | 53.5 | 6       | 14               | 36.5 | 6       | 8    | 5       | 8     | 29.9  | 72    | 84   | 96   | 6       | 6    | 47.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 15               | 17 | 8  | 8  | 6             | 7.5  | 5       | 8    | 35.1 | 31.0  | 31.0  | 35.0  | 6       | 13   | 53.5 | 6       | 13               | 36.5 | 6       | 8    | 5       | 7     | 29.4  | 73    | 85   | 97   | 6       | 6    | 47.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 16               | 18 | 8  | 8  | 6             | 8    | 5       | 7    | 33.4 | 32.0  | 36.0  | 36.0  | 6       | 13   | 52.5 | 6       | 13               | 36.5 | 6       | 8    | 5       | 6.5   | 28.0  | 74    | 86   | 98   | 6       | 6.5  | 47.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 17               | 19 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 33.3 | 37.0  | 37.0  | 37.0  | 6       | 13   | 52.5 | 6       | 13               | 36.5 | 6       | 8    | 5       | 6.5   | 28.0  | 75    | 87   | 99   | 6       | 6    | 47.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 18               | 20 | 8  | 8  | 6             | 7    | 5       | 6.5  | 33.1 | 38.0  | 38.0  | 38.0  | 6       | 13   | 52.0 | 6       | 13               | 36.5 | 6       | 8    | 5       | 6     | 28.1  | 76    | 88   | 100  | 6       | 6    | 47.5      | 5       | 12   | 5                                  | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 19               | 21 | 8  | 8  | 6             | 7    | 5       | 6    | 33.1 | 39.0  | 39.0  | 39.0  | 6       | 13   | 52.0 | 6       | 13               | 36.0 | 6       | 7.5  | 6       | 7.5   | 31.3  | 77    | 89   | 101  | 7       | 7.5  | 50.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 20               | 22 | 8  | 8  | 6             | 7    | 6       | 7.5  | 37.1 | 44.0  | 44.0  | 44.0  | 6       | 12   | 51.5 | 6       | 12               | 35.5 | 6       | 7.5  | 6       | 7     | 31.4  | 78    | 90   | 102  | 7       | 7.5  | 50.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 21               | 23 | 8  | 8  | 6             | 6.5  | 6       | 7    | 37.1 | 45.0  | 45.0  | 45.0  | 6       | 12   | 51.0 | 6       | 12               | 34.5 | 6       | 7.5  | 6       | 6.5   | 31.5  | 79    | 91   | 103  | 7       | 7    | 50.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 22               | 23 | 8  | 8  | 6             | 6.5  | 6       | 6.5  | 37.0 | 46.0  | 46.0  | 46.0  | 7       | 15   | 55.5 | 7       | 15               | 38.5 | 6       | 6.5  | 6       | 6.5   | 31.6  | 79    | 91   | 103  | 7       | 7    | 50.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 22               | 24 | 8  | 8  | 6             | 6    | 6       | 6.5  | 37.1 | 46.0  | 46.0  | 46.0  | 7       | 15   | 55.5 | 7       | 15               | 39.5 | 6       | 7    | 6       | 6     | 31.6  | 80    | 92   | 104  | 7       | 7    | 50.0      | 5       | 12   | 5                                  | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 23               | 25 | 8  | 8  | 6             | 6    | 6       | 6    | 37.1 | 47.0  | 47.0  | 47.0  | 7       | 15   | 55.0 | 7       | 15               | 38.5 | 6       | 7    | 6       | 6     | 31.9  | 81    | 93   | 105  | 7       | 6.5  | 50.0      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 24               | 26 | 9  | 8  | 6             | 6    | 6       | 7    | 38.0 | 48.0  | 48.0  | 48.0  | 7       | 14   | 54.0 | 7       | 14               | 37.5 | 6       | 7    | 6       | 6.5   | 32.5  | 82    | 94   | 106  | 7       | 6.5  | 50.0      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 25               | 27 | 9  | 8  | 6             | 6    | 6       | 6.5  | 38.0 | 49.0  | 49.0  | 49.0  | 7       | 14   | 53.5 | 7       | 14               | 37.0 | 6       | 7    | 6       | 6.5   | 32.6  | 83    | 95   | 107  | 7       | 6    | 50.0      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 25               | 28 | 9  | 8  | 7             | 7.5  | 6       | 6.5  | 38.1 | 49.0  | 49.0  | 49.0  | 7       | 14   | 53.0 | 7       | 14               | 37.5 | 6       | 6.5  | 6       | 6     | 32.8  | 84    | 96   | 108  | 7       | 6    | 50.0      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 26               | 28 | 9  | 8  | 7             | 7.5  | 6       | 6.5  | 38.1 | 50.0  | 50.0  | 50.0  | 7       | 13   | 52.5 | 7       | 13               | 36.5 | 6       | 6.5  | 6       | 6     | 32.9  | 84    | 96   | 108  | 7       | 6    | 50.0      | 5       | 12   | 5                                  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 27               | 29 | 9  | 8  | 7             | 7.5  | 6       | 6    | 38.1 | 51.0  | 51.0  | 51.0  | 7       | 14   | 51.5 | 7       | 14               | 36.5 | 6       | 6.5  | 6       | 6     | 33.0  | 85    | 97   | 109  | 7       | 6    | 50.0      | 5       | 12   | 5                                  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 27               | 30 | 10 | 8  | 7             | 7    | 6       | 7    | 39.0 | 51.0  | 51.0  | 51.0  | 7       | 13   | 51.5 | 7       | 13               | 36.0 | 6       | 6.5  | 6       | 6.5   | 33.5  | 86    | 98   | 110  | 7       | 6    | 50.0      | 5       | 12   | 5                                  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 10 FT |                  |      |      |      |               |       |         |        |      |      |      |      |         |    |         |      |                  |       |         |        |      |      |      |      |         |      |         |     |           | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |    |   |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|------|------|------|---------------|-------|---------|--------|------|------|------|------|---------|----|---------|------|------------------|-------|---------|--------|------|------|------|------|---------|------|---------|-----|-----------|-------------------------------------|----|---|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |       |         |        |      |      |      |      |         |    |         |      | BOTTOM SLAB BARS |       |         |        |      |      |      |      |         |      |         |     | WALL BARS |                                     |    |   |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      | A1 BARS       |       | J3 BARS |        |      |      |      |      | H1 BARS |    | H2 BARS |      | A2 BARS          |       | J4 BARS |        |      |      |      |      | H3 BARS |      | B1 BARS |     | B2 BARS   |                                     |    |   |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA. | C1            | K2    |         |        | SIZE | SPA. | C5   | SIZE | SPA.    | C6 | SIZE    | SPA. | C4               | K3    |         |        | SIZE | SPA. | C7   | SIZE | SPA.    | SIZE | SPA.    | G1  |           |                                     |    |   |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      |               | HT=8' | HT=9'   | HT=10' |      |      |      |      |         |    |         |      |                  | HT=8' | HT=9'   | HT=10' |      |      |      |      |         |      |         |     |           |                                     |    |   |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 13               | 10   | 8    | 8    | 5             | 6.5   | 5       | 8.5    | 50.9 | 29.0 | 33.0 | 33.0 | 5       | 14 | 100.0   | 5    | 14               | 29.5  | 5       | 8.5    | 6    | 7.5  | 71.6 | 102  | 114     | 126  | 5       | 6   | 47.5      | 5                                   | 12 | 5 | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 13               | 11   | 8    | 8    | 5             | 6.5   | 5       | 8.5    | 50.9 | 29.0 | 33.0 | 33.0 | 5       | 13 | 100.0   | 5    | 13               | 28.5  | 5       | 8.5    | 5    | 6    | 64.1 | 103  | 115     | 127  | 5       | 6   | 47.0      | 5                                   | 12 | 5 | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 13               | 11   | 9    | 8    | 5             | 6.5   | 5       | 6      | 69.0 | 29.0 | 33.0 | 33.0 | 5       | 12 | 100.0   | 5    | 12               | 30.0  | 5       | 7.5    | 5    | 6    | 64.1 | 103  | 115     | 127  | 6       | 6.5 | 49.5      | 5                                   | 10 | 5 | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 9                | 10   | 9    | 8    | 5             | 7.5   | 5       | 6      | 69.0 | 25.0 | 25.0 | 29.0 | 5       | 12 | 73.0    | 5    | 12               | 30.0  | 5       | 7.5    | 5    | 6    | 55.4 | 102  | 114     | 126  | 6       | 6.5 | 49.5      | 5                                   | 10 | 5 | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 9                | 10   | 9    | 8    | 5             | 8.5   | 5       | 6      | 51.4 | 25.0 | 29.0 | 29.0 | 6       | 15 | 54.0    | 6    | 15               | 32.0  | 5       | 7      | 6    | 7    | 53.4 | 102  | 114     | 126  | 6       | 6   | 48.5      | 5                                   | 12 | 5 | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 10               | 11   | 9    | 8    | 5             | 8     | 5       | 6      | 48.0 | 26.0 | 30.0 | 30.0 | 5       | 12 | 48.0    | 5    | 12               | 28.5  | 5       | 7      | 6    | 7.5  | 50.9 | 103  | 115     | 127  | 6       | 6   | 48.0      | 5                                   | 12 | 5 | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 11               | 12   | 9    | 8    | 5             | 7.5   | 5       | 6      | 46.0 | 31.0 | 31.0 | 31.0 | 6       | 16 | 49.5    | 6    | 16               | 31.0  | 5       | 6.5    | 5    | 6    | 46.3 | 104  | 116     | 128  | 6       | 6   | 48.0      | 5                                   | 12 | 5 | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 12               | 13   | 9    | 8    | 5             | 7     | 5       | 6      | 44.5 | 32.0 | 32.0 | 32.0 | 6       | 15 | 48.5    | 6    | 15               | 31.0  | 5       | 6.5    | 5    | 6    | 45.0 | 105  | 117     | 129  | 6       | 6   | 47.5      | 5                                   | 12 | 5 | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 13               | 14   | 9    | 8    | 5             | 6.5   | 5       | 6      | 43.3 | 33.0 | 33.0 | 33.0 | 6       | 15 | 48.0    | 6    | 15               | 30.5  | 5       | 6      | 5    | 6    | 43.9 | 106  | 118     | 130  | 6       | 6   | 47.5      | 5                                   | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 14               | 15   | 9    | 8    | 5             | 6     | 5       | 6      | 42.1 | 34.0 | 34.0 | 34.0 | 6       | 15 | 47.5    | 6    | 15               | 30.5  | 5       | 6      | 5    | 6    | 43.0 | 107  | 119     | 131  | 6       | 6   | 47.5      | 5                                   | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 15               | 16   | 10   | 8    | 6             | 8.5   | 5       | 6.5    | 47.1 | 35.0 | 35.0 | 35.0 | 6       | 15 | 53.0    | 6    | 15               | 36.5  | 6       | 8      | 5    | 7    | 42.8 | 108  | 120     | 132  | 6       | 6   | 47.5      | 5                                   | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 15               | 17   | 10   | 8    | 6             | 8     | 6       | 8      | 50.6 | 35.0 | 35.0 | 35.0 | 6       | 13 | 52.5    | 6    | 13               | 36.5  | 6       | 8      | 5    | 6.5  | 42.3 | 109  | 121     | 133  | 6       | 6   | 47.5      | 5                                   | 12 | 5 | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 16               | 18   | 10   | 8    | 6             | 8     | 5       | 6      | 44.5 | 36.0 | 36.0 | 36.0 | 6       | 14 | 52.0    | 6    | 14               | 36.0  | 6       | 8      | 5    | 7    | 40.0 | 110  | 122     | 134  | 6       | 6.5 | 47.5      | 5                                   | 12 | 5 | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 17               | 19   | 10   | 8    | 6             | 7.5   | 6       | 8      | 48.4 | 37.0 | 37.0 | 37.0 | 6       | 14 | 51.5    | 6    | 14               | 36.0  | 6       | 8      | 5    | 6.5  | 40.1 | 111  | 123     | 135  | 6       | 6   | 47.5      | 5                                   | 12 | 5 | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 18               | 20   | 11   | 8    | 6             | 7.5   | 5       | 6      | 45.0 | 38.0 | 38.0 | 38.0 | 6       | 13 | 51.0    | 6    | 13               | 35.5  | 6       | 7.5    | 5    | 7    | 40.5 | 112  | 124     | 136  | 6       | 6   | 47.5      | 5                                   | 12 | 5 | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 19               | 21   | 11   | 8    | 6             | 7     | 6       | 8      | 49.0 | 39.0 | 39.0 | 39.0 | 6       | 13 | 50.5    | 6    | 13               | 35.0  | 6       | 7.5    | 5    | 7    | 40.5 | 113  | 125     | 137  | 7       | 7.5 | 50.5      | 5                                   | 12 | 5 | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 19               | 22   | 12   | 8    | 6             | 6.5   | 6       | 8      | 49.8 | 39.0 | 39.0 | 39.0 | 6       | 13 | 50.0    | 6    | 13               | 35.5  | 6       | 7.5    | 5    | 6.5  | 40.9 | 114  | 126     | 138  | 7       | 7.5 | 50.5      | 5                                   | 12 | 5 | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 20               | 23   | 12   | 8    | 6             | 6.5   | 6       | 8      | 49.6 | 40.0 | 40.0 | 40.0 | 6       | 12 | 49.5    | 6    | 12               | 34.5  | 6       | 7.5    | 5    | 6.5  | 41.0 | 115  | 127     | 139  | 7       | 7   | 50.5      | 5                                   | 12 | 5 | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 21               | 24   | 12   | 8    | 6             | 6.5   | 6       | 7.5    | 49.6 | 41.0 | 41.0 | 41.0 | 6       | 12 | 49.0    | 6    | 12               | 33.5  | 6       | 7.5    | 5    | 6.5  | 41.1 | 116  | 128     | 140  | 7       | 7   | 50.5      | 5                                   | 12 | 5 | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 22               | 25   | 12   | 8    | 6             | 6.5   | 6       | 6.5    | 49.6 | 42.0 | 42.0 | 42.0 | 7       | 15 | 53.0    | 7    | 15               | 38.0  | 6       | 7      | 5    | 6.5  | 41.3 | 117  | 129     | 141  | 7       | 6.5 | 50.5      | 5                                   | 12 | 5 | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 23               | 26   | 13   | 8    | 6             | 6     | 6       | 7.5    | 50.4 | 43.0 | 43.0 | 43.0 | 7       | 15 | 52.0    | 7    | 15               | 37.0  | 6       | 7      | 5    | 6    | 41.8 | 118  | 130     | 142  | 7       | 6.5 | 50.5      | 5                                   | 12 | 5 | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 23               | 26   | 13   | 8    | 6             | 6     | 6       | 7      | 50.3 | 43.0 | 43.0 | 43.0 | 7       | 15 | 52.0    | 7    | 15               | 37.5  | 6       | 6.5    | 5    | 6    | 41.6 | 118  | 130     | 142  | 7       | 6.5 | 50.5      | 5                                   | 12 | 5 | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 24               | 27   | 14   | 8    | 6             | 6     | 6       | 7.5    | 51.0 | 44.0 | 44.0 | 44.0 | 7       | 14 | 51.5    | 7    | 14               | 36.5  | 6       | 6.5    | 5    | 6    | 42.1 | 119  | 131     | 143  | 7       | 6   | 50.5      | 5                                   | 12 | 5 | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 24               | 28   | 14   | 8    | 7             | 7     | 6       | 7      | 51.1 | 44.0 | 44.0 | 44.0 | 7       | 14 | 51.5    | 7    | 14               | 37.0  | 6       | 6.5    | 5    | 6    | 42.1 | 120  | 132     | 144  | 7       | 6   | 50.5      | 5                                   | 12 | 5 | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 25               | 29   | 14   | 8    | 7             | 7.5   | 6       | 6.5    | 51.1 | 45.0 | 49.0 | 49.0 | 7       | 14 | 51.0    | 7    | 14               | 36.0  | 6       | 6.5    | 6    | 8.5  | 45.4 | 121  | 133     | 145  | 7       | 6   | 50.5      | 5                                   | 12 | 5 | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 26               | 30   | 14   | 8    | 7             | 7     | 6       | 6      | 51.1 | 46.0 | 50.0 | 50.0 | 7       | 15 | 50.5    | 7    | 15               | 36.0  | 6       | 6.5    | 6    | 8    | 45.6 | 122  | 134     | 146  | 7       | 6   | 50.5      | 5                                   | 12 | 5 | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 26               | 30   | 15   | 8    | 7             | 7     | 6       | 6.5    | 51.9 | 50.0 | 50.0 | 50.0 | 7       | 14 | 50.5    | 7    | 14               | 36.0  | 6       | 6      | 6    | 8    | 45.8 | 122  | 134     | 146  | 8       | 7.5 | 56.5      | 5                                   | 12 | 6 | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 10 FT |                  |    |    |    |               |      |         |      |      |        |        |        |         |      |       |         |                  |      |         |      |         |      |      |        |        |        |         |      |           |         |      | HEIGHT (HT) = 11 FT OR 12 FT OR 13 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|--------|--------|--------|---------|------|-------|---------|------------------|------|---------|------|---------|------|------|--------|--------|--------|---------|------|-----------|---------|------|---------------------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |        |        |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |      |      |        |        |        |         |      | WALL BARS |         |      |                                       |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |        |        |        | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |        |        |        | H3 BARS |      |           | B1 BARS |      | B2 BARS                               |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |        |        | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3     |        |        | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE                                  | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=11' | HT=12' | HT=13' |         |      |       |         |                  |      |         |      |         |      |      | HT=11' | HT=12' | HT=13' |         |      |           |         |      |                                       |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 13               | 10 | 9  | 10 | 5             | 6.5  | 5       | 6.5  | 51.9 | 33.0   | 33.0   | 33.0   | 5       | 14   | 101.0 | 5       | 14               | 30.0 | 5       | 7.5  | 6       | 6    | 85.4 | 138    | 150    | 162    | 6       | 7    | 51.0      | 5       | 12   | 5                                     | 8.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 13               | 11 | 9  | 10 | 5             | 6.5  | 5       | 6    | 51.9 | 33.0   | 33.0   | 33.0   | 5       | 13   | 101.0 | 5       | 13               | 29.0 | 5       | 8    | 6       | 6    | 82.6 | 139    | 151    | 163    | 5       | 6    | 47.5      | 5       | 12   | 5                                     | 8.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 13               | 11 | 10 | 10 | 5             | 6.5  | 6       | 7    | 52.5 | 33.0   | 33.0   | 33.0   | 5       | 12   | 101.5 | 5       | 12               | 30.5 | 5       | 7    | 6       | 6    | 82.6 | 139    | 151    | 163    | 6       | 6    | 50.0      | 5       | 10   | 5                                     | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 9                | 10 | 10 | 10 | 5             | 7.5  | 6       | 7    | 52.5 | 29.0   | 29.0   | 33.0   | 5       | 12   | 101.5 | 5       | 12               | 30.5 | 5       | 7    | 6       | 6    | 74.5 | 138    | 150    | 162    | 6       | 6    | 50.0      | 5       | 10   | 5                                     | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 9                | 11 | 10 | 10 | 5             | 8.5  | 6       | 7    | 70.4 | 29.0   | 29.0   | 33.0   | 5       | 12   | 50.5  | 5       | 12               | 29.5 | 5       | 7    | 6       | 6    | 71.0 | 139    | 151    | 163    | 6       | 6.5  | 49.5      | 5       | 12   | 5                                     | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 10               | 12 | 11 | 10 | 5             | 8    | 5       | 6    | 62.6 | 30.0   | 30.0   | 30.0   | 5       | 12   | 47.5  | 5       | 12               | 29.0 | 5       | 7    | 5       | 6    | 64.6 | 140    | 152    | 164    | 6       | 6.5  | 48.5      | 5       | 12   | 5                                     | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 11               | 12 | 11 | 10 | 5             | 7.5  | 5       | 6.5  | 60.9 | 31.0   | 31.0   | 31.0   | 5       | 12   | 46.5  | 5       | 12               | 28.5 | 5       | 6.5  | 6       | 6.5  | 64.4 | 140    | 152    | 164    | 6       | 6    | 48.0      | 5       | 12   | 5                                     | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 11               | 13 | 11 | 10 | 5             | 7.5  | 6       | 7.5  | 60.6 | 31.0   | 31.0   | 35.0   | 6       | 15   | 48.5  | 6       | 15               | 31.5 | 5       | 6    | 6       | 6.5  | 63.6 | 141    | 153    | 165    | 6       | 6    | 48.0      | 5       | 12   | 5                                     | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 12               | 14 | 11 | 10 | 5             | 7    | 6       | 7.5  | 59.6 | 32.0   | 32.0   | 36.0   | 6       | 14   | 48.0  | 6       | 14               | 31.5 | 5       | 6    | 6       | 6.5  | 62.5 | 142    | 154    | 166    | 6       | 6    | 48.0      | 5       | 12   | 5                                     | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 13               | 15 | 12 | 10 | 5             | 6.5  | 6       | 7.5  | 58.4 | 33.0   | 33.0   | 37.0   | 6       | 14   | 47.5  | 6       | 14               | 31.0 | 6       | 8    | 6       | 7    | 61.1 | 143    | 155    | 167    | 6       | 6    | 48.0      | 5       | 12   | 5                                     | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 14               | 16 | 12 | 10 | 5             | 6    | 6       | 7    | 58.0 | 34.0   | 38.0   | 38.0   | 6       | 14   | 47.0  | 6       | 14               | 31.0 | 6       | 8    | 6       | 6.5  | 60.5 | 144    | 156    | 168    | 6       | 6.5  | 48.0      | 5       | 12   | 5                                     | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 15               | 17 | 13 | 10 | 6             | 8    | 6       | 7    | 64.0 | 35.0   | 39.0   | 39.0   | 6       | 14   | 52.5  | 6       | 14               | 37.0 | 6       | 8    | 6       | 6.5  | 59.9 | 145    | 157    | 169    | 6       | 6.5  | 48.0      | 5       | 12   | 5                                     | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 15               | 18 | 13 | 10 | 6             | 7.5  | 6       | 7    | 61.1 | 35.0   | 35.0   | 39.0   | 6       | 13   | 52.0  | 6       | 13               | 37.0 | 6       | 8    | 6       | 7.5  | 57.4 | 146    | 158    | 170    | 6       | 6.5  | 48.0      | 5       | 12   | 5                                     | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 16               | 19 | 13 | 10 | 6             | 7.5  | 6       | 6.5  | 61.3 | 36.0   | 36.0   | 40.0   | 6       | 13   | 51.5  | 6       | 13               | 36.5 | 6       | 7.5  | 6       | 7.5  | 57.4 | 147    | 159    | 171    | 6       | 6    | 48.0      | 5       | 12   | 5                                     | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 17               | 20 | 14 | 10 | 6             | 7.5  | 6       | 7    | 61.8 | 37.0   | 37.0   | 41.0   | 6       | 13   | 51.5  | 6       | 13               | 36.5 | 6       | 7.5  | 6       | 7.5  | 57.6 | 148    | 160    | 172    | 6       | 6    | 48.0      | 5       | 12   | 5                                     | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 18               | 21 | 14 | 10 | 6             | 7    | 6       | 6.5  | 61.9 | 38.0   | 38.0   | 42.0   | 6       | 13   | 51.0  | 6       | 13               | 36.5 | 6       | 7.5  | 6       | 7.5  | 57.8 | 149    | 161    | 173    | 7       | 7.5  | 51.0      | 5       | 12   | 5                                     | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 19               | 22 | 15 | 10 | 6             | 7    | 6       | 6.5  | 62.4 | 39.0   | 43.0   | 43.0   | 6       | 13   | 50.0  | 6       | 13               | 35.5 | 6       | 7.5  | 6       | 7.5  | 58.0 | 150    | 162    | 174    | 7       | 7.5  | 51.0      | 5       | 12   | 6                                     | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 20               | 23 | 15 | 10 | 6             | 7    | 6       | 6    | 62.5 | 44.0   | 44.0   | 44.0   | 6       | 12   | 49.5  | 6       | 12               | 34.5 | 6       | 7    | 6       | 7.5  | 58.1 | 151    | 163    | 175    | 7       | 7    | 51.0      | 5       | 12   | 6                                     | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 21               | 24 | 16 | 10 | 6             | 6.5  | 6       | 6.5  | 63.0 | 41.0   | 45.0   | 45.0   | 6       | 12   | 48.5  | 6       | 12               | 33.5 | 6       | 7    | 6       | 7.5  | 58.5 | 152    | 164    | 176    | 7       | 7    | 51.0      | 5       | 12   | 6                                     | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 21               | 25 | 16 | 10 | 6             | 6    | 6       | 6    | 62.9 | 45.0   | 45.0   | 45.0   | 6       | 12   | 48.5  | 6       | 12               | 34.0 | 6       | 7    | 6       | 7.5  | 58.6 | 153    | 165    | 177    | 7       | 6.5  | 51.0      | 5       | 12   | 6                                     | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 22               | 26 | 17 | 10 | 6             | 6.5  | 6       | 6    | 63.5 | 42.0   | 46.0   | 46.0   | 7       | 15   | 52.5  | 7       | 15               | 38.5 | 6       | 7    | 6       | 7    | 59.0 | 154    | 166    | 178    | 7       | 6.5  | 51.0      | 5       | 12   | 6                                     | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 23               | 26 | 17 | 10 | 6             | 6    | 6       | 6    | 63.5 | 47.0   | 47.0   | 47.0   | 7       | 15   | 52.0  | 7       | 15               | 37.5 | 6       | 6    | 6       | 7    | 58.9 | 154    | 166    | 178    | 7       | 6.5  | 51.0      | 5       | 12   | 6                                     | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 24               | 27 | 18 | 10 | 6             | 6    | 6       | 6    | 64.1 | 44.0   | 48.0   | 48.0   | 7       | 15   | 51.5  | 7       | 15               | 37.0 | 6       | 6.5  | 6       | 6.5  | 59.3 | 155    | 167    | 179    | 7       | 6    | 51.0      | 5       | 12   | 6                                     | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 24               | 28 | 19 | 10 | 7             | 8    | 6       | 6    | 64.6 | 44.0   | 48.0   | 48.0   | 7       | 14   | 51.5  | 7       | 14               | 37.0 | 6       | 6.5  | 6       | 6.5  | 59.6 | 156    | 168    | 180    | 7       | 6    | 51.0      | 5       | 12   | 6                                     | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 25               | 29 | 19 | 10 | 7             | 7.5  | 6       | 6    | 64.8 | 49.0   | 49.0   | 49.0   | 7       | 15   | 51.0  | 7       | 15               | 36.5 | 6       | 6.5  | 6       | 6.5  | 59.9 | 157    | 169    | 181    | 7       | 6    | 51.0      | 5       | 12   | 6                                     | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 25               | 30 | 20 | 10 | 7             | 7.5  | 7       | 8    | 70.3 | 49.0   | 49.0   | 49.0   | 7       | 15   | 51.0  | 7       | 15               | 36.5 | 6       | 6.5  | 6       | 6.5  | 60.3 | 158    | 170    | 182    | 7       | 6    | 51.0      | 5       | 12   | 6                                     | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 26               | 31 | 20 | 10 | 7             | 7    | 7       | 7    | 70.4 | 50.0   | 50.0   | 50.0   | 7       | 15   | 50.5  | 7       | 15               | 36.5 | 6       | 6    | 6       | 6    | 60.5 | 159    | 171    | 183    | 7       | 6    | 51.0      | 5       | 12   | 6                                     | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

BRYAN A. HARTNAGEL

NUMBER PE-2002024473

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 10 FEET  
HEIGHT (HT): 11 THRU 13 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
15 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

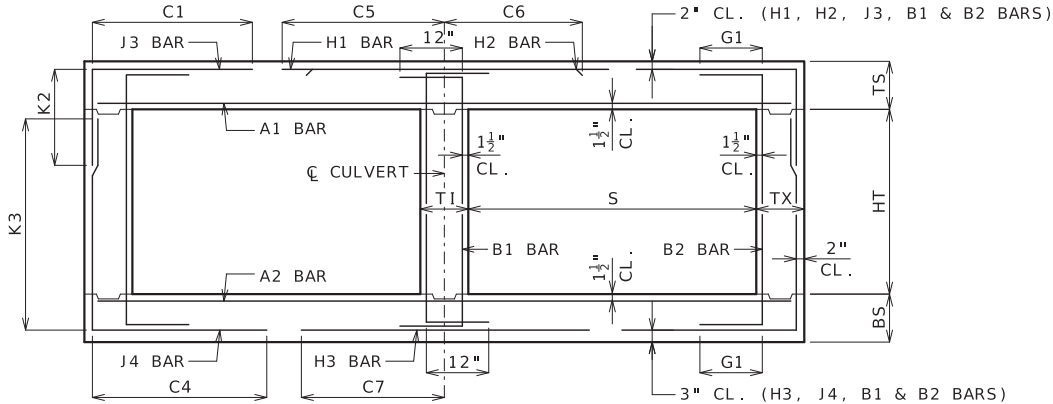
| SPAN (S) = 11 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |       |         |                  |      |         |      |         |       |       |       |      |      |         |      |           |         |      | HEIGHT (HT) = 6 FT OR 7 FT OR 8 FT |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|-------|---------|------------------|------|---------|------|---------|-------|-------|-------|------|------|---------|------|-----------|---------|------|------------------------------------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |       |       |       |      |      |         |      | WALL BARS |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |       |       |       |      |      | H3 BARS |      |           | B1 BARS |      | B2 BARS                            |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | C4      | K3    |       |       | SIZE | SPA. | C7      | SIZE | SPA.      | SIZE    | SPA. | G1                                 |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=6' | HT=7' | HT=8' |         |      |       |         |                  |      |         |      |         | HT=6' | HT=7' | HT=8' |      |      |         |      |           |         |      |                                    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 8  | 8  | 5             | 6    | 4       | 6.5  | 52.5 | 30.0  | 30.0  | 30.0  | 5       | 13   | 106.5 | 5       | 13               | 30.0 | 5       | 8    | 5       | 7     | 52.9  | 78    | 90   | 102  | 6       | 7    | 53.5      | 5       | 12   | 5                                  | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 14               | 11 | 8  | 8  | 5             | 6    | 4       | 6    | 52.5 | 30.0  | 30.0  | 30.0  | 5       | 12   | 106.5 | 5       | 12               | 29.0 | 5       | 8    | 5       | 8     | 49.1  | 79    | 91   | 103  | 6       | 7    | 53.0      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 14               | 11 | 8  | 8  | 5             | 6    | 5       | 6    | 52.5 | 30.0  | 30.0  | 30.0  | 6       | 16   | 106.5 | 6       | 16               | 35.0 | 5       | 7    | 5       | 6.5   | 49.1  | 79    | 91   | 103  | 6       | 6    | 53.0      | 5       | 10.5 | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 10               | 10 | 8  | 8  | 5             | 7    | 5       | 6    | 45.6 | 26.0  | 26.0  | 30.0  | 6       | 16   | 72.5  | 6       | 16               | 35.0 | 5       | 7    | 5       | 6.5   | 43.0  | 78    | 90   | 102  | 6       | 6    | 52.5      | 5       | 10.5 | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 10               | 11 | 8  | 8  | 5             | 7.5  | 5       | 6    | 40.8 | 26.0  | 26.0  | 30.0  | 6       | 15   | 58.5  | 6       | 15               | 33.5 | 5       | 6.5  | 5       | 7.5   | 39.5  | 79    | 91   | 103  | 6       | 6    | 52.0      | 5       | 12   | 5                                  | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11               | 12 | 8  | 8  | 5             | 7.5  | 5       | 7    | 38.6 | 27.0  | 27.0  | 31.0  | 6       | 15   | 54.5  | 6       | 15               | 33.0 | 5       | 6.5  | 5       | 8     | 37.3  | 80    | 92   | 104  | 6       | 6    | 51.5      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12               | 13 | 8  | 8  | 5             | 7    | 5       | 7.5  | 36.6 | 28.0  | 28.0  | 32.0  | 6       | 14   | 53.0  | 6       | 14               | 32.5 | 5       | 6    | 5       | 8     | 35.6  | 81    | 93   | 105  | 6       | 6    | 51.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 13               | 14 | 8  | 8  | 5             | 6.5  | 5       | 7.5  | 35.3 | 29.0  | 33.0  | 33.0  | 6       | 14   | 52.0  | 6       | 14               | 32.5 | 6       | 8.5  | 5       | 8.5   | 34.6  | 82    | 94   | 106  | 6       | 6    | 51.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 14               | 15 | 8  | 8  | 5             | 6    | 5       | 8    | 34.1 | 30.0  | 34.0  | 34.0  | 6       | 13   | 51.5  | 6       | 13               | 32.0 | 6       | 8    | 5       | 8.5   | 33.8  | 83    | 95   | 107  | 6       | 6    | 51.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 15               | 16 | 8  | 8  | 6             | 8    | 5       | 7.5  | 38.3 | 31.0  | 35.0  | 35.0  | 6       | 13   | 57.0  | 6       | 13               | 38.0 | 6       | 7.5  | 5       | 8     | 33.1  | 84    | 96   | 108  | 6       | 6    | 51.0      | 5       | 12   | 5                                  | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 16               | 17 | 8  | 8  | 6             | 8    | 5       | 7    | 37.5 | 32.0  | 36.0  | 36.0  | 6       | 12   | 56.5  | 6       | 12               | 38.0 | 6       | 7    | 5       | 7     | 32.6  | 85    | 97   | 109  | 7       | 7    | 53.5      | 5       | 12   | 5                                  | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 17               | 18 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 37.1 | 37.0  | 37.0  | 37.0  | 6       | 12   | 56.5  | 6       | 12               | 38.0 | 6       | 7    | 5       | 6.5   | 32.4  | 86    | 98   | 110  | 7       | 7    | 53.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 18               | 20 | 8  | 8  | 6             | 7    | 5       | 6.5  | 37.1 | 38.0  | 38.0  | 38.0  | 6       | 12   | 56.0  | 6       | 12               | 37.5 | 6       | 7.5  | 5       | 6     | 32.4  | 88    | 100  | 112  | 6       | 6    | 50.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 19               | 20 | 8  | 8  | 6             | 6.5  | 5       | 6    | 35.1 | 39.0  | 39.0  | 39.0  | 6       | 12   | 55.0  | 6       | 12               | 37.5 | 6       | 7    | 5       | 6     | 30.9  | 88    | 100  | 112  | 6       | 6    | 50.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 20               | 21 | 8  | 8  | 6             | 6.5  | 6       | 7.5  | 39.1 | 44.0  | 44.0  | 44.0  | 6       | 12   | 54.5  | 6       | 12               | 37.5 | 6       | 6.5  | 6       | 7.5   | 33.9  | 89    | 101  | 113  | 7       | 7    | 53.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 21               | 22 | 8  | 8  | 6             | 6.5  | 6       | 7    | 39.1 | 45.0  | 45.0  | 45.0  | 6       | 12   | 54.5  | 6       | 12               | 37.0 | 6       | 6    | 6       | 7     | 34.0  | 90    | 102  | 114  | 7       | 7    | 53.5      | 5       | 12   | 5                                  | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 22               | 23 | 8  | 8  | 6             | 6    | 6       | 6.5  | 39.1 | 46.0  | 46.0  | 46.0  | 7       | 15   | 59.0  | 7       | 15               | 41.0 | 6       | 6    | 6       | 6.5   | 34.1  | 91    | 103  | 115  | 7       | 7    | 53.5      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 23               | 24 | 8  | 8  | 6             | 6    | 6       | 6    | 39.1 | 47.0  | 47.0  | 47.0  | 7       | 15   | 58.5  | 7       | 15               | 40.5 | 6       | 6    | 6       | 6     | 34.3  | 92    | 104  | 116  | 7       | 7    | 53.5      | 5       | 12   | 5                                  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 23               | 26 | 9  | 8  | 7             | 7.5  | 6       | 7    | 40.3 | 47.0  | 47.0  | 47.0  | 7       | 15   | 58.0  | 7       | 15               | 41.0 | 6       | 6.5  | 6       | 6.5   | 34.8  | 94    | 106  | 118  | 7       | 6.5  | 53.5      | 5       | 12   | 5                                  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 24               | 27 | 9  | 8  | 7             | 7.5  | 6       | 7    | 40.3 | 48.0  | 48.0  | 48.0  | 7       | 14   | 57.5  | 7       | 14               | 40.5 | 6       | 6.5  | 6       | 6.5   | 34.9  | 95    | 107  | 119  | 7       | 6    | 53.5      | 5       | 12   | 5                                  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 25               | 27 | 9  | 8  | 7             | 7.5  | 6       | 6.5  | 40.1 | 49.0  | 49.0  | 49.0  | 7       | 14   | 57.0  | 7       | 14               | 39.5 | 6       | 6    | 6       | 6.5   | 35.0  | 95    | 107  | 119  | 7       | 6    | 53.5      | 5       | 12   | 5                                  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 26               | 28 | 10 | 8  | 7             | 7.5  | 6       | 7    | 40.9 | 50.0  | 50.0  | 50.0  | 7       | 13   | 56.0  | 7       | 13               | 38.5 | 6       | 6    | 6       | 7     | 35.5  | 96    | 108  | 120  | 7       | 6    | 53.5      | 5       | 12   | 5                                  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 27               | 29 | 10 | 8  | 7             | 7    | 6       | 7    | 41.0 | 51.0  | 51.0  | 51.0  | 7       | 13   | 55.0  | 7       | 13               | 37.5 | 6       | 6    | 6       | 6.5   | 35.8  | 97    | 109  | 121  | 8       | 7.5  | 59.5      | 5       | 12   | 5                                  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 27               | 30 | 11 | 8  | 7             | 6.5  | 5       | 6    | 37.9 | 47.0  | 47.0  | 47.0  | 7       | 13   | 54.5  | 7       | 13               | 38.0 | 6       | 6    | 6       | 7     | 36.1  | 98    | 110  | 122  | 8       | 7.5  | 59.5      | 5       | 12   | 5                                  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 28               | 31 | 11 | 8  | 7             | 6.5  | 6       | 7.5  | 41.9 | 52.0  | 52.0  | 52.0  | 7       | 12   | 54.0  | 7       | 12               | 37.5 | 6       | 6    | 6       | 7     | 36.4  | 99    | 111  | 123  | 8       | 7    | 59.5      | 5       | 12   | 5                                  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 29               | 32 | 11 | 8  | 7             | 6.5  | 6       | 7    | 41.9 | 53.0  | 53.0  | 53.0  | 7       | 12   | 53.5  | 7       | 12               | 37.0 | 6       | 6    | 6       | 6.5   | 36.5  | 100   | 112  | 124  | 8       | 7    | 59.0      | 5       | 12   | 5                                  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 29               | 33 | 11 | 8  | 7             | 6.5  | 6       | 7    | 42.0 | 53.0  | 53.0  | 53.0  | 7       | 12   | 53.5  | 7       | 12               | 37.0 | 6       | 6    | 6       | 6.5   | 36.6  | 101   | 113  | 125  | 8       | 7    | 59.0      | 5       | 12   | 5                                  | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 11 FT |                  |      |      |      |               |     |         |       |        |        |         |      |         |      |         |      |                  |      |     |       |         |        |         |      |         |      |      |      |           | HEIGHT (HT) = 9 FT OR 10 FT OR 11 FT |      |     |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|------|------|------|---------------|-----|---------|-------|--------|--------|---------|------|---------|------|---------|------|------------------|------|-----|-------|---------|--------|---------|------|---------|------|------|------|-----------|--------------------------------------|------|-----|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |     |         |       |        |        |         |      |         |      |         |      | BOTTOM SLAB BARS |      |     |       |         |        |         |      |         |      |      |      | WALL BARS |                                      |      |     |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      | A1 BARS       |     | J3 BARS |       |        |        | H1 BARS |      | H2 BARS |      | A2 BARS |      | J4 BARS          |      |     |       | H3 BARS |        | B1 BARS |      | B2 BARS |      |      |      |           |                                      |      |     |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA. | C1            | K2  |         |       | SIZE   | SPA.   | C5      | SIZE | SPA.    | C6   | SIZE    | SPA. | C4               | K3   |     |       | SIZE    | SPA.   | C7      | SIZE | SPA.    | SIZE | SPA. | G1   |           |                                      |      |     |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS   | TX   | T1   |               |     |         | HT=9' | HT=10' | HT=11' |         |      |         |      |         |      |                  |      |     | HT=9' | HT=10'  | HT=11' |         |      |         |      |      |      |           |                                      |      |     |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10   | 8    | 9    | 5             | 6   | 5       | 8     | 54.6   | 34.0   | 34.0    | 34.0 | 5       | 13   | 109.0   | 5    | 13               | 30.5 | 5   | 7.5   | 6       | 6      | 76.4    | 114  | 126     | 138  | 6    | 6.5  | 54.0      | 5                                    | 12   | 5   | 10   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 14               | 11   | 8    | 9    | 5             | 6   | 5       | 8     | 54.6   | 34.0   | 34.0    | 34.0 | 5       | 12   | 109.0   | 5    | 12               | 29.5 | 5   | 7.5   | 6       | 6.5    | 71.8    | 115  | 127     | 139  | 6    | 7    | 53.5      | 5                                    | 12   | 5   | 10   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 14               | 11   | 9    | 9    | 5             | 6   | 5       | 6     | 82.4   | 34.0   | 34.0    | 34.0 | 6       | 16   | 109.0   | 6    | 16               | 35.0 | 5   | 7     | 6       | 6.5    | 71.8    | 115  | 127     | 139  | 7    | 7    | 55.5      | 5                                    | 10.5 | 5   | 10   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 10               | 10   | 9    | 9    | 5             | 7   | 5       | 6     | 82.4   | 30.0   | 30.0    | 30.0 | 6       | 16   | 84.0    | 6    | 16               | 35.0 | 5   | 7     | 6       | 6.5    | 62.1    | 114  | 126     | 138  | 7    | 7    | 55.5      | 5                                    | 10.5 | 5   | 10   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 10               | 11   | 9    | 9    | 5             | 7.5 | 5       | 6     | 56.3   | 30.0   | 30.0    | 30.0 | 6       | 15   | 58.5    | 6    | 15               | 33.5 | 5   | 6.5   | 6       | 6.5    | 58.1    | 115  | 127     | 139  | 6    | 6    | 52.0      | 5                                    | 12   | 5   | 9.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11               | 12   | 10   | 9    | 5             | 7.5 | 5       | 6     | 52.4   | 31.0   | 31.0    | 31.0 | 6       | 15   | 54.5    | 6    | 15               | 33.0 | 5   | 6     | 5       | 6      | 52.1    | 116  | 128     | 140  | 6    | 6    | 51.5      | 5                                    | 12   | 5   | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 11               | 13   | 10   | 9    | 5             | 7.5 | 5       | 6     | 49.6   | 31.0   | 31.0    | 31.0 | 6       | 14   | 52.5    | 6    | 14               | 32.5 | 5   | 6     | 5       | 6      | 50.5    | 117  | 129     | 141  | 6    | 6    | 51.5      | 5                                    | 12   | 5   | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 12               | 14   | 10   | 9    | 5             | 6.5 | 5       | 6     | 48.1   | 32.0   | 32.0    | 32.0 | 6       | 13   | 52.0    | 6    | 13               | 32.5 | 6   | 8     | 5       | 6      | 49.0    | 118  | 130     | 142  | 6    | 6    | 51.0      | 5                                    | 12   | 5   | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 14               | 15   | 10   | 9    | 5             | 6   | 5       | 6     | 47.1   | 34.0   | 34.0    | 34.0 | 6       | 14   | 51.5    | 6    | 14               | 32.5 | 6   | 8     | 5       | 6      | 47.9    | 119  | 131     | 143  | 6    | 6    | 51.0      | 5                                    | 12   | 5   | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 15               | 16   | 10   | 9    | 6             | 8   | 6       | 8     | 55.0   | 35.0   | 35.0    | 35.0 | 6       | 13   | 57.0    | 6    | 13               | 38.5 | 6   | 7.5   | 5       | 6      | 46.9    | 120  | 132     | 144  | 6    | 6    | 51.0      | 5                                    | 12   | 5   | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 16               | 17   | 10   | 9    | 6             | 8   | 6       | 7.5   | 53.9   | 36.0   | 36.0    | 40.0 | 6       | 13   | 56.5    | 6    | 13               | 38.0 | 6   | 7     | 6       | 7      | 49.0    | 121  | 133     | 145  | 6    | 6    | 51.0      | 5                                    | 12   | 5   | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 17               | 18   | 11   | 9    | 6             | 7.5 | 6       | 8     | 54.0   | 37.0   | 37.0    | 37.0 | 6       | 13   | 56.0    | 6    | 13               | 38.0 | 6   | 6.5   | 5       | 6      | 45.9    | 122  | 134     | 146  | 6    | 6    | 51.0      | 5                                    | 12   | 5   | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 18               | 20   | 12   | 9    | 6             | 7   | 6       | 8     | 54.4   | 38.0   | 38.0    | 38.0 | 6       | 13   | 55.5    | 6    | 13               | 38.0 | 6   | 7.5   | 5       | 6.5    | 46.0    | 124  | 136     | 148  | 6    | 6    | 51.0      | 5                                    | 12   | 5   | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 18               | 20   | 12   | 9    | 6             | 7   | 6       | 8     | 52.1   | 38.0   | 38.0    | 38.0 | 6       | 12   | 54.5    | 6    | 12               | 37.5 | 6   | 6.5   | 5       | 6.5    | 43.5    | 124  | 136     | 148  | 6    | 6    | 51.0      | 5                                    | 12   | 5   | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 19               | 22   | 12   | 9    | 6             | 6.5 | 6       | 7.5   | 52.1   | 39.0   | 39.0    | 39.0 | 6       | 12   | 54.5    | 6    | 12               | 37.5 | 6   | 7     | 5       | 6.5    | 43.6    | 126  | 138     | 150  | 7    | 7.5  | 54.0      | 5                                    | 12   | 5   | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 20               | 23   | 12   | 9    | 6             | 6.5 | 6       | 7     | 52.1   | 40.0   | 40.0    | 40.0 | 6       | 12   | 54.0    | 6    | 12               | 37.5 | 6   | 7     | 5       | 6      | 43.8    | 127  | 139     | 151  | 7    | 7    | 54.0      | 5                                    | 12   | 5   | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 21               | 24   | 13   | 9    | 6             | 6   | 6       | 7.5   | 52.8   | 41.0   | 41.0    | 41.0 | 6       | 12   | 53.0    | 6    | 12               | 37.5 | 6   | 6.5   | 5       | 6      | 44.1    | 128  | 140     | 152  | 7    | 7    | 54.0      | 5                                    | 12   | 5   | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 22               | 25   | 13   | 9    | 6             | 6   | 6       | 7     | 52.8   | 42.0   | 42.0    | 42.0 | 7       | 15   | 56.5    | 7    | 15               | 41.0 | 6   | 6.5   | 5       | 6      | 44.3    | 129  | 141     | 153  | 7    | 6.5  | 54.0      | 5                                    | 12   | 5   | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 23               | 26   | 13   | 9    | 6             | 6   | 6.5     | 52.8  | 43.0   | 43.0   | 43.0    | 7    | 15      | 57.0 | 7       | 15   | 40.0             | 6    | 6.5 | 5     | 6       | 44.4   | 130     | 142  | 154     | 7    | 6.5  | 54.0 | 5         | 12                                   | 5    | 6.5 | 0    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 24               | 27   | 14   | 9    | 7             | 8   | 6       | 7     | 53.4   | 44.0   | 44.0    | 44.0 | 7       | 14   | 56.0    | 7    | 14               | 39.5 | 6   | 6.5   | 5       | 6      | 44.8    | 131  | 143     | 155  | 7    | 6    | 54.0      | 5                                    | 12   | 5   | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 25               | 28   | 14   | 9    | 7             | 7.5 | 6       | 7     | 53.4   | 45.0   | 45.0    | 45.0 | 7       | 14   | 55.0    | 7    | 14               | 38.5 | 6   | 6.5   | 5       | 6      | 44.9    | 132  | 144     | 156  | 7    | 6    | 54.0      | 5                                    | 12   | 5   | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 25               | 29   | 14   | 9    | 7             | 7   | 6       | 6     | 53.4   | 45.0   | 49.0    | 49.0 | 7       | 14   | 55.0    | 7    | 14               | 39.0 | 6   | 6     | 6       | 8.5    | 47.9    | 133  | 145     | 157  | 8    | 7.5  | 60.0      | 5                                    | 12   | 5   | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 26               | 30   | 15   | 9    | 7             | 7   | 6       | 6.5   | 54.1   | 50.0   | 50.0    | 50.0 | 7       | 13   | 54.0    | 7    | 13               | 38.0 | 6   | 6     | 6       | 8      | 48.4    | 134  | 146     | 158  | 8    | 7.5  | 60.0      | 5                                    | 12   | 6   | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 27               | 31   | 15   | 9    | 7             | 7   | 6       | 6.5   | 54.1   | 51.0   | 51.0    | 51.0 | 7       | 13   | 54.0    | 7    | 13               | 37.0 | 6   | 6     | 6       | 7.5    | 48.6    | 135  | 147     | 159  | 8    | 7    | 60.0      | 5                                    | 12   | 6   | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 27               | 32   | 16   | 9    | 7             | 6.5 | 6       | 6.5   | 55.0   | 51.0   | 51.0    | 51.0 | 7       | 13   | 53.5    | 7    | 13               | 37.5 | 6   | 6     | 6       | 7.5    | 48.9    | 136  | 148     | 160  | 8    | 7    | 60.0      | 5                                    | 12   | 6   | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 28               | 32   | 16   | 9    | 7             | 6.5 | 6       | 6     | 54.9   | 52.0   | 52.0    | 52.0 | 7       | 13   | 53.0    | 7    | 13               | 37.0 | 7   | 8     | 6       | 7.5    | 49.0    | 136  | 148     | 160  | 8    | 7    | 60.0      | 5                                    | 12   | 6   | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 29               | 33   | 17   | 9    | 7             | 6.5 | 6       | 6.5   | 55.6   | 53.0   | 53.0    | 53.0 | 7       | 13   | 52.5    | 7    | 13               | 37.0 | 7   | 7.5   | 6       | 7      | 49.5    | 137  | 149     | 161  | 8    | 7    | 60.0      | 5                                    | 12   | 6   | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 11 FT |                     |    |    |    |               |      |         |      |      |        |        |        |         |      |       |         |                  |      |         |      |         |        |        |        |      |      |         |      |           |         |      |         | HEIGHT (HT) = 12 FT OR 13 FT OR 14 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|--------|--------|--------|---------|------|-------|---------|------------------|------|---------|------|---------|--------|--------|--------|------|------|---------|------|-----------|---------|------|---------|---------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |        |        |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |        |        |        |      |      |         |      | WALL BARS |         |      |         |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |        |        |        | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |        |        |        |      |      | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |        |        | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | C4      | K3     |        |        | SIZE | SPA. | C7      | SIZE | SPA.      | SIZE    | SPA. | G1      |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=12' | HT=13' | HT=14' |         |      |       |         |                  |      |         |      |         | HT=12' | HT=13' | HT=14' |      |      |         |      |           |         |      |         |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14                  | 12 | 9  | 11 | 5             | 6    | 5       | 6    | 55.6 | 34.0   | 34.0   | 34.0   | 5       | 13   | 110.0 | 5       | 13               | 30.5 | 5       | 8    | 6       | 6      | 94.6   | 152    | 164  | 176  | 5       | 6    | 51.5      | 5       | 12   | 5       | 8.5                                   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 14                  | 12 | 9  | 11 | 5             | 6    | 6       | 7.5  | 55.6 | 34.0   | 34.0   | 38.0   | 5       | 12   | 110.0 | 5       | 12               | 30.0 | 5       | 7.5  | 6       | 6      | 89.4   | 152    | 164  | 176  | 5       | 6    | 51.0      | 5       | 12   | 5       | 8.5                                   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 14                  | 12 | 10 | 11 | 5             | 6    | 6       | 7    | 58.3 | 34.0   | 34.0   | 38.0   | 6       | 16   | 112.5 | 6       | 16               | 35.5 | 5       | 7    | 6       | 6      | 89.4   | 152    | 164  | 176  | 6       | 7    | 53.5      | 5       | 11.5 | 5       | 8                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 10                  | 12 | 10 | 11 | 5             | 7    | 6       | 7    | 58.3 | 30.0   | 30.0   | 34.0   | 6       | 16   | 112.5 | 6       | 16               | 35.5 | 5       | 7    | 6       | 6.5    | 83.4   | 152    | 164  | 176  | 6       | 7    | 53.5      | 5       | 11.5 | 5       | 8                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 10                  | 12 | 10 | 11 | 5             | 7.5  | 6       | 6.5  | 78.8 | 30.0   | 34.0   | 34.0   | 6       | 15   | 57.5  | 6       | 15               | 34.0 | 5       | 6.5  | 6       | 6      | 77.1   | 152    | 164  | 176  | 6       | 6.5  | 52.5      | 5       | 12   | 5       | 7.5                                   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 10                  | 13 | 10 | 11 | 5             | 7.5  | 6       | 6    | 70.1 | 34.0   | 34.0   | 34.0   | 6       | 14   | 54.0  | 6       | 14               | 33.5 | 5       | 6    | 6       | 6      | 74.1   | 153    | 165  | 177  | 6       | 6.5  | 52.0      | 5       | 12   | 5       | 7                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 11                  | 13 | 11 | 11 | 5             | 7.5  | 6       | 7    | 67.0 | 31.0   | 31.0   | 35.0   | 6       | 14   | 52.5  | 6       | 14               | 33.0 | 5       | 6    | 6       | 6      | 69.9   | 153    | 165  | 177  | 6       | 6    | 51.5      | 5       | 12   | 5       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 12                  | 14 | 12 | 11 | 5             | 7    | 6       | 8    | 64.6 | 32.0   | 32.0   | 36.0   | 6       | 14   | 51.5  | 6       | 14               | 33.0 | 6       | 8    | 6       | 7      | 67.6   | 154    | 166  | 178  | 6       | 6    | 51.5      | 5       | 12   | 5       | 7                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 13                  | 15 | 12 | 11 | 5             | 6.5  | 6       | 7    | 63.4 | 33.0   | 37.0   | 37.0   | 6       | 13   | 51.0  | 6       | 13               | 33.0 | 6       | 7.5  | 6       | 6.5    | 66.4   | 155    | 167  | 179  | 6       | 6    | 51.0      | 5       | 12   | 5       | 7                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 14                  | 16 | 13 | 11 | 5             | 6    | 6       | 7    | 62.3 | 34.0   | 38.0   | 38.0   | 6       | 13   | 51.0  | 6       | 13               | 33.0 | 6       | 7    | 6       | 7      | 64.8   | 156    | 168  | 180  | 6       | 6    | 51.0      | 5       | 12   | 5       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 15                  | 17 | 13 | 11 | 6             | 8    | 6       | 6.5  | 67.6 | 35.0   | 39.0   | 39.0   | 6       | 12   | 56.5  | 6       | 12               | 38.5 | 6       | 6.5  | 6       | 6      | 63.8   | 157    | 169  | 181  | 6       | 6    | 51.0      | 5       | 12   | 5       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 16                  | 19 | 14 | 11 | 6             | 8    | 6       | 6.5  | 67.4 | 36.0   | 40.0   | 40.0   | 6       | 12   | 56.0  | 6       | 12               | 38.5 | 6       | 7.5  | 6       | 6.5    | 63.8   | 159    | 171  | 183  | 6       | 6    | 51.5      | 5       | 12   | 5       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 17                  | 20 | 14 | 11 | 6             | 7.5  | 6       | 6    | 67.3 | 37.0   | 41.0   | 41.0   | 6       | 12   | 55.5  | 6       | 12               | 38.5 | 6       | 7    | 6       | 6      | 63.5   | 160    | 172  | 184  | 6       | 6    | 51.0      | 5       | 12   | 5       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 18                  | 21 | 15 | 11 | 6             | 7    | 6       | 6.5  | 67.4 | 42.0   | 42.0   | 42.0   | 6       | 12   | 55.0  | 6       | 12               | 38.5 | 6       | 7    | 6       | 6.5    | 63.4   | 161    | 173  | 185  | 7       | 7.5  | 54.5      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 19                  | 22 | 15 | 11 | 6             | 6.5  | 6       | 6.5  | 65.3 | 43.0   | 43.0   | 43.0   | 6       | 13   | 54.5  | 6       | 13               | 38.0 | 6       | 7    | 6       | 7      | 61.1   | 162    | 174  | 186  | 7       | 7.5  | 54.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 20                  | 23 | 15 | 11 | 6             | 6.5  | 6       | 6    | 65.3 | 44.0   | 44.0   | 44.0   | 6       | 12   | 54.0  | 6       | 12               | 38.0 | 6       | 7    | 6       | 6.5    | 61.3   | 163    | 175  | 187  | 7       | 7    | 54.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 21                  | 24 | 16 | 11 | 6             | 6.5  | 6       | 6    | 65.8 | 45.0   | 45.0   | 45.0   | 6       | 12   | 53.0  | 6       | 12               | 37.0 | 6       | 6.5  | 6       | 7      | 61.4   | 164    | 176  | 188  | 7       | 7    | 54.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 22                  | 25 | 16 | 11 | 6             | 6    | 7       | 7.5  | 70.8 | 46.0   | 46.0   | 46.0   | 7       | 15   | 57.5  | 7       | 15               | 41.0 | 6       | 6.5  | 6       | 6.5    | 61.6   | 165    | 177  | 189  | 7       | 6.5  | 54.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 23                  | 26 | 17 | 11 | 6             | 6    | 6       | 6    | 66.4 | 47.0   | 47.0   | 47.0   | 7       | 15   | 56.5  | 7       | 15               | 40.0 | 6       | 6.5  | 6       | 7      | 61.9   | 166    | 178  | 190  | 7       | 6.5  | 54.5      | 5       | 12   | 6       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 23                  | 27 | 17 | 11 | 7             | 7.5  | 7       | 7    | 71.3 | 47.0   | 47.0   | 47.0   | 7       | 15   | 56.5  | 7       | 15               | 41.0 | 6       | 6.5  | 6       | 6.5    | 62.0   | 167    | 179  | 191  | 7       | 6    | 54.5      | 5       | 12   | 6       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 24                  | 28 | 18 | 11 | 7             | 7.5  | 7       | 7.5  | 71.8 | 48.0   | 48.0   | 48.0   | 7       | 14   | 55.5  | 7       | 14               | 40.0 | 6       | 6    | 6       | 6.5    | 62.4   | 168    | 180  | 192  | 7       | 6    | 54.5      | 5       | 12   | 6       | 7                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 25                  | 29 | 19 | 11 | 7             | 7.5  | 7       | 7.5  | 72.4 | 49.0   | 49.0   | 49.0   | 7       | 14   | 55.0  | 7       | 14               | 39.0 | 6       | 6    | 6       | 6.5    | 62.6   | 169    | 181  | 193  | 8       | 7.5  | 60.5      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 26                  | 30 | 19 | 11 | 7             | 7.5  | 7       | 7    | 72.5 | 50.0   | 50.0   | 50.0   | 7       | 13   | 54.5  | 7       | 13               | 38.0 | 6       | 6    | 6       | 6.5    | 62.9   | 170    | 182  | 194  | 8       | 7.5  | 60.5      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 27                  | 31 | 20 | 11 | 7             | 7    | 7       | 7.5  | 73.0 | 51.0   | 51.0   | 51.0   | 7       | 14   | 54.0  | 7       | 14               | 38.0 | 6       | 6    | 6       | 6      | 63.3   | 171    | 183  | 195  | 8       | 7    | 60.5      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 28                  | 32 | 20 | 11 | 7             | 7    | 7       | 6.5  | 73.1 | 52.0   | 52.0   | 52.0   | 7       | 14   | 53.5  | 7       | 14               | 38.0 | 6       | 6    | 6       | 6      | 63.5   | 172    | 184  | 196  | 8       | 7    | 60.5      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 28                  | 32 | 21 | 11 | 7             | 6.5  | 7       | 6.5  | 73.6 | 52.0   | 52.0   | 52.0   | 7       | 14   | 53.5  | 7       | 14               | 37.5 | 7       | 7    | 6       | 6      | 63.5   | 172    | 184  | 196  | 8       | 7    | 60.5      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 28                  | 33 | 22 | 11 | 7             | 6.5  | 7       | 6.5  | 74.1 | 52.0   | 52.0   | 52.0   | 7       | 13   | 53.5  | 7       | 13               | 37.5 | 7       | 7.5  | 6       | 6      | 63.9   | 173    | 185  | 197  | 8       | 7    | 60.5      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 11 FEET  
HEIGHT (HT): 12 THRU 14 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
17 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| SPAN (S) = 12 FT |                     |    |    |    |               |      |         |      |      |       |       |       |         |      |       |         |                  |      |         |      |         |       |       |       |      |      |         |      |           |         |      |         | HEIGHT (HT) = 6 FT OR 7 FT OR 8 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|-------|---------|------------------|------|---------|------|---------|-------|-------|-------|------|------|---------|------|-----------|---------|------|---------|------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |       |       |       |      |      |         |      | WALL BARS |         |      |         |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |       |       |       |      |      | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | C4      | K3    |       |       | SIZE | SPA. | C7      | SIZE | SPA.      | SIZE    | SPA. | G1      |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=6' | HT=7' | HT=8' |         |      |       |         |                  |      |         |      |         | HT=6' | HT=7' | HT=8' |      |      |         |      |           |         |      |         |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14                  | 10 | 8  | 8  | 5             | 6    | 4       | 6    | 56.1 | 30.0  | 30.0  | 30.0  | 5       | 12   | 115.0 | 5       | 12               | 31.5 | 5       | 7.5  | 5       | 6.5   | 52.4  | 78    | 90   | 102  | 6       | 6.5  | 56.5      | 5       | 12   | 5       | 12                                 | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15                  | 11 | 8  | 8  | 6             | 8    | 4       | 6.5  | 59.1 | 31.0  | 31.0  | 31.0  | 6       | 16   | 118.0 | 6       | 16               | 39.0 | 5       | 7.5  | 5       | 7.5   | 47.9  | 79    | 91   | 103  | 6       | 6.5  | 56.0      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15                  | 11 | 8  | 8  | 6             | 8    | 5       | 7    | 59.1 | 31.0  | 31.0  | 31.0  | 6       | 15   | 118.0 | 6       | 15               | 39.0 | 5       | 6.5  | 5       | 6     | 47.9  | 79    | 91   | 103  | 7       | 6.5  | 58.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11                  | 10 | 8  | 8  | 5             | 6.5  | 5       | 7    | 43.6 | 31.0  | 31.0  | 31.0  | 6       | 15   | 77.5  | 6       | 15               | 36.5 | 5       | 6.5  | 5       | 6     | 42.6  | 78    | 90   | 102  | 7       | 6.5  | 58.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11                  | 11 | 8  | 8  | 5             | 7    | 5       | 6.5  | 40.9 | 27.0  | 31.0  | 31.0  | 6       | 14   | 63.0  | 6       | 14               | 35.0 | 5       | 6.5  | 5       | 7     | 39.3  | 79    | 91   | 103  | 7       | 6.5  | 57.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11                  | 13 | 8  | 8  | 5             | 7    | 5       | 6    | 39.1 | 27.0  | 27.0  | 31.0  | 6       | 12   | 58.0  | 6       | 12               | 34.0 | 5       | 6    | 5       | 8.5   | 36.3  | 81    | 93   | 105  | 6       | 6    | 54.5      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12                  | 14 | 8  | 8  | 5             | 6.5  | 5       | 6.5  | 37.0 | 28.0  | 28.0  | 32.0  | 6       | 12   | 56.5  | 6       | 12               | 33.5 | 6       | 8    | 5       | 8.5   | 34.5  | 82    | 94   | 106  | 6       | 6    | 54.5      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14                  | 15 | 8  | 8  | 5             | 6    | 5       | 8    | 34.6 | 30.0  | 34.0  | 34.0  | 6       | 13   | 55.5  | 6       | 13               | 33.5 | 6       | 7.5  | 5       | 8.5   | 33.8  | 83    | 95   | 107  | 7       | 7    | 57.0      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15                  | 16 | 8  | 8  | 6             | 8    | 5       | 7.5  | 38.4 | 31.0  | 35.0  | 35.0  | 6       | 12   | 61.0  | 6       | 12               | 39.5 | 6       | 7.5  | 5       | 8     | 32.9  | 84    | 96   | 108  | 7       | 7    | 57.0      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 16                  | 17 | 8  | 8  | 6             | 8    | 5       | 7    | 37.5 | 32.0  | 36.0  | 36.0  | 7       | 16   | 65.5  | 7       | 16               | 44.5 | 6       | 7    | 5       | 7     | 32.3  | 85    | 97   | 109  | 7       | 6.5  | 57.0      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 17                  | 19 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 37.0 | 37.0  | 37.0  | 37.0  | 7       | 15   | 65.0  | 7       | 15               | 44.0 | 6       | 7    | 5       | 6.5   | 31.6  | 87    | 99   | 111  | 7       | 7    | 57.0      | 5       | 12   | 5       | 10.5                               | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 18                  | 20 | 8  | 8  | 6             | 7    | 5       | 6.5  | 36.4 | 38.0  | 38.0  | 38.0  | 7       | 15   | 64.5  | 7       | 15               | 44.0 | 6       | 6.5  | 5       | 6     | 31.3  | 88    | 100  | 112  | 7       | 7    | 57.0      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 19                  | 21 | 8  | 8  | 6             | 6    | 5       | 6    | 36.0 | 39.0  | 39.0  | 39.0  | 7       | 14   | 64.0  | 7       | 14               | 44.0 | 6       | 6.5  | 6       | 7.5   | 34.1  | 89    | 101  | 113  | 7       | 7    | 57.0      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 21                  | 22 | 8  | 8  | 6             | 6    | 6       | 7    | 39.6 | 45.0  | 45.0  | 45.0  | 7       | 15   | 63.5  | 7       | 15               | 44.0 | 6       | 6.5  | 6       | 7     | 34.4  | 90    | 102  | 114  | 7       | 7    | 56.5      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 21                  | 23 | 8  | 8  | 6             | 6    | 6       | 7    | 38.3 | 45.0  | 45.0  | 45.0  | 7       | 14   | 63.0  | 7       | 14               | 43.5 | 6       | 6.5  | 6       | 6.5   | 32.8  | 91    | 103  | 115  | 7       | 7    | 56.5      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 23                  | 24 | 8  | 8  | 6             | 6    | 6       | 6    | 38.3 | 47.0  | 47.0  | 47.0  | 7       | 15   | 62.0  | 7       | 15               | 43.0 | 6       | 6    | 6       | 6     | 33.0  | 92    | 104  | 116  | 7       | 7    | 56.5      | 5       | 12   | 5       | 9                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 23                  | 25 | 8  | 8  | 7             | 7    | 6       | 6    | 38.3 | 47.0  | 47.0  | 47.0  | 7       | 14   | 62.0  | 7       | 14               | 43.5 | 6       | 6    | 6       | 6     | 33.0  | 93    | 105  | 117  | 7       | 6.5  | 56.5      | 5       | 12   | 5       | 8.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 25                  | 27 | 9  | 8  | 7             | 7.5  | 6       | 6.5  | 39.1 | 49.0  | 49.0  | 49.0  | 7       | 14   | 61.0  | 7       | 14               | 41.5 | 6       | 6    | 6       | 6.5   | 33.8  | 95    | 107  | 119  | 7       | 6    | 56.5      | 5       | 12   | 5       | 8.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 25                  | 28 | 9  | 8  | 7             | 6.5  | 6       | 6.5  | 39.3 | 49.0  | 49.0  | 49.0  | 7       | 13   | 61.0  | 7       | 13               | 42.5 | 6       | 6    | 6       | 6     | 33.8  | 96    | 108  | 120  | 7       | 6    | 56.5      | 5       | 12   | 5       | 8.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 26                  | 29 | 9  | 8  | 7             | 6.5  | 6       | 6.5  | 39.3 | 50.0  | 50.0  | 50.0  | 7       | 13   | 60.0  | 7       | 13               | 41.5 | 6       | 6    | 6       | 6     | 33.9  | 97    | 109  | 121  | 8       | 7.5  | 62.5      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 27                  | 30 | 10 | 8  | 7             | 6.5  | 6       | 7    | 40.1 | 51.0  | 51.0  | 51.0  | 7       | 13   | 59.0  | 7       | 13               | 41.0 | 6       | 6    | 6       | 6.5   | 34.5  | 98    | 110  | 122  | 8       | 7.5  | 62.5      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 28                  | 31 | 10 | 8  | 7             | 6.5  | 6       | 6.5  | 40.1 | 52.0  | 52.0  | 52.0  | 7       | 12   | 58.5  | 7       | 12               | 40.0 | 7       | 8    | 6       | 6     | 34.6  | 99    | 111  | 123  | 8       | 7    | 62.5      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 29                  | 32 | 10 | 8  | 7             | 6.5  | 6       | 6.5  | 40.1 | 53.0  | 53.0  | 53.0  | 7       | 12   | 57.5  | 7       | 12               | 39.0 | 7       | 8    | 6       | 6     | 34.9  | 100   | 112  | 124  | 8       | 7    | 62.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 30                  | 33 | 10 | 8  | 7             | 6.5  | 6       | 6    | 40.3 | 54.0  | 54.0  | 54.0  | 7       | 12   | 56.5  | 7       | 12               | 38.5 | 7       | 7.5  | 7       | 6.5   | 38.1  | 101   | 113  | 125  | 8       | 6.5  | 62.0      | 5       | 12   | 5       | 7                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 31                  | 34 | 10 | 8  | 7             | 6    | 6       | 6    | 40.3 | 55.0  | 55.0  | 55.0  | 8       | 15   | 64.0  | 8       | 15               | 45.5 | 7       | 7.5  | 7       | 6.5   | 38.3  | 102   | 114  | 126  | 8       | 6.5  | 62.0      | 5       | 12   | 5       | 6.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 31                  | 34 | 11 | 8  | 7             | 6    | 6       | 6.5  | 41.0 | 55.0  | 55.0  | 55.0  | 8       | 15   | 64.0  | 8       | 15               | 46.0 | 7       | 6.5  | 6       | 6     | 35.6  | 102   | 114  | 126  | 8       | 6.5  | 62.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 32                  | 35 | 11 | 8  | 8             | 7.5  | 6       | 6.5  | 41.0 | 56.0  | 56.0  | 56.0  | 8       | 15   | 63.5  | 8       | 15               | 45.5 | 7       | 7    | 6       | 6     | 35.8  | 103   | 115  | 127  | 8       | 6.5  | 62.0      | 5       | 12   | 5       | 7                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 12 FT |                  |      |      |      |               |       |         |        |      |      |      |      |         |    |         |      |                  |       |         |        |      |      |      |      |         |      |         |     |           |   |      | HEIGHT (HT) = 9 FT OR 10 FT OR 11 FT |      |    |  |  |  |  |  |  |  |  |  |
|------------------|------------------|------|------|------|---------------|-------|---------|--------|------|------|------|------|---------|----|---------|------|------------------|-------|---------|--------|------|------|------|------|---------|------|---------|-----|-----------|---|------|--------------------------------------|------|----|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |       |         |        |      |      |      |      |         |    |         |      | BOTTOM SLAB BARS |       |         |        |      |      |      |      |         |      |         |     | WALL BARS |   |      |                                      |      |    |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      | A1 BARS       |       | J3 BARS |        |      |      |      |      | H1 BARS |    | H2 BARS |      | A2 BARS          |       | J4 BARS |        |      |      |      |      | H3 BARS |      | B1 BARS |     | B2 BARS   |   |      |                                      |      |    |  |  |  |  |  |  |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA. | C1            | K2    |         |        | SIZE | SPA. | C5   | SIZE | SPA.    | C6 | SIZE    | SPA. | C4               | K3    |         |        | SIZE | SPA. | C7   | SIZE | SPA.    | SIZE | SPA.    | G1  |           |   |      |                                      |      |    |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      |               | HT=9' | HT=10'  | HT=11' |      |      |      |      |         |    |         |      |                  | HT=9' | HT=10'  | HT=11' |      |      |      |      |         |      |         |     |           |   |      |                                      |      |    |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 11   | 8    | 9    | 5             | 6     | 5       | 8      | 58.3 | 34.0 | 34.0 | 34.0 | 5       | 12 | 117.5   | 5    | 12               | 32.0  | 5       | 7.5    | 6    | 6.5  | 77.5 | 115  | 127     | 139  | 6       | 7   | 57.0      | 5 | 12   | 5                                    | 10   | 12 |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12   | 8    | 9    | 6             | 8     | 5       | 8      | 62.3 | 35.0 | 35.0 | 35.0 | 6       | 16 | 121.5   | 6    | 16               | 39.5  | 5       | 7.5    | 6    | 7    | 71.9 | 116  | 128     | 140  | 6       | 7   | 56.5      | 5 | 12   | 5                                    | 10   | 12 |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 12   | 9    | 9    | 6             | 8     | 6       | 7      | 76.1 | 35.0 | 35.0 | 35.0 | 6       | 15 | 121.5   | 6    | 15               | 39.5  | 5       | 6.5    | 6    | 7    | 71.9 | 116  | 128     | 140  | 6       | 6   | 56.5      | 5 | 11.5 | 5                                    | 10   | 12 |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 11   | 9    | 9    | 5             | 6.5   | 6       | 7      | 76.1 | 31.0 | 31.0 | 35.0 | 6       | 15 | 86.0    | 6    | 15               | 37.0  | 5       | 6.5    | 6    | 7    | 61.8 | 115  | 127     | 139  | 6       | 6   | 56.0      | 5 | 11.5 | 5                                    | 10.5 | 12 |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 12   | 9    | 9    | 5             | 7     | 6       | 7      | 59.0 | 31.0 | 31.0 | 35.0 | 6       | 14 | 63.0    | 6    | 14               | 35.5  | 5       | 6      | 6    | 7    | 57.6 | 116  | 128     | 140  | 6       | 6   | 55.0      | 5 | 12   | 5                                    | 10   | 12 |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11               | 13   | 9    | 9    | 5             | 7     | 6       | 7      | 54.0 | 31.0 | 31.0 | 35.0 | 6       | 13 | 58.0    | 6    | 13               | 34.5  | 5       | 6      | 6    | 7    | 54.5 | 117  | 129     | 141  | 6       | 6   | 55.0      | 5 | 12   | 5                                    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12               | 14   | 10   | 9    | 5             | 7     | 5       | 6      | 49.0 | 32.0 | 32.0 | 32.0 | 6       | 12 | 56.0    | 6    | 12               | 34.0  | 6       | 8      | 5    | 6.5  | 49.3 | 118  | 130     | 142  | 7       | 7   | 57.5      | 5 | 12   | 5                                    | 10   | 0  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 13               | 15   | 10   | 9    | 5             | 6.5   | 6       | 7.5    | 50.1 | 33.0 | 33.0 | 33.0 | 6       | 12 | 55.0    | 6    | 12               | 33.5  | 6       | 7.5    | 5    | 6.5  | 47.6 | 119  | 131     | 143  | 7       | 7   | 57.5      | 5 | 12   | 5                                    | 9    | 0  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15               | 16   | 10   | 9    | 6             | 8     | 5       | 6      | 50.6 | 35.0 | 35.0 | 35.0 | 6       | 12 | 60.5    | 6    | 12               | 39.5  | 6       | 7      | 5    | 6    | 46.4 | 120  | 132     | 144  | 7       | 7   | 57.0      | 5 | 12   | 5                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 16               | 17   | 10   | 9    | 6             | 8     | 6       | 7.5    | 53.8 | 36.0 | 36.0 | 36.0 | 6       | 12 | 60.0    | 6    | 12               | 39.5  | 6       | 6.5    | 5    | 6    | 45.4 | 121  | 133     | 145  | 7       | 6.5 | 57.0      | 5 | 12   | 5                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 17               | 19   | 10   | 9    | 6             | 7.5   | 6       | 7      | 53.1 | 37.0 | 37.0 | 41.0 | 7       | 16 | 64.5    | 7    | 16               | 44.5  | 6       | 7      | 6    | 7.5  | 47.8 | 123  | 135     | 147  | 7       | 7   | 57.0      | 5 | 12   | 5                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 18               | 20   | 11   | 9    | 6             | 7     | 6       | 7.5    | 53.1 | 38.0 | 38.0 | 38.0 | 7       | 15 | 64.0    | 7    | 15               | 44.0  | 6       | 6.5    | 5    | 6    | 44.6 | 124  | 136     | 148  | 7       | 7   | 57.0      | 5 | 12   | 5                                    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 19               | 21   | 12   | 9    | 6             | 6.5   | 6       | 7.5    | 53.5 | 39.0 | 39.0 | 39.0 | 7       | 15 | 63.5    | 7    | 15               | 44.0  | 6       | 6.5    | 5    | 6.5  | 44.8 | 125  | 137     | 149  | 7       | 7   | 57.0      | 5 | 12   | 5                                    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 20               | 23   | 12   | 9    | 6             | 6.5   | 6       | 7      | 53.4 | 40.0 | 40.0 | 40.0 | 7       | 15 | 63.0    | 7    | 15               | 44.0  | 6       | 6.5    | 5    | 6.5  | 44.6 | 127  | 139     | 151  | 7       | 7   | 57.0      | 5 | 12   | 5                                    | 7    | 0  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 21               | 23   | 12   | 9    | 6             | 6     | 6       | 7.5    | 51.4 | 41.0 | 41.0 | 41.0 | 7       | 15 | 62.0    | 7    | 15               | 43.5  | 6       | 6      | 5    | 6.5  | 42.8 | 127  | 139     | 151  | 7       | 7   | 57.0      | 5 | 12   | 5                                    | 7    | 0  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 22               | 25   | 12   | 9    | 6             | 6     | 6       | 7      | 51.4 | 42.0 | 42.0 | 42.0 | 7       | 15 | 61.5    | 7    | 15               | 43.5  | 6       | 6.5    | 5    | 6.5  | 42.9 | 129  | 141     | 153  | 7       | 6.5 | 57.0      | 5 | 12   | 5                                    | 7    | 0  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 23               | 26   | 12   | 9    | 7             | 7.5   | 6       | 6.5    | 51.3 | 43.0 | 43.0 | 43.0 | 7       | 15 | 61.0    | 7    | 15               | 43.5  | 6       | 6      | 5    | 6    | 43.0 | 130  | 142     | 154  | 7       | 6.5 | 57.0      | 5 | 12   | 5                                    | 7    | 0  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 24               | 27   | 13   | 9    | 7             | 7.5   | 6       | 7      | 52.0 | 44.0 | 44.0 | 44.0 | 7       | 14 | 60.5    | 7    | 14               | 42.5  | 6       | 6      | 5    | 6    | 43.4 | 131  | 143     | 155  | 7       | 6   | 57.0      | 5 | 12   | 5                                    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 25               | 28   | 13   | 9    | 7             | 7     | 6       | 7      | 52.0 | 45.0 | 45.0 | 45.0 | 7       | 14 | 59.5    | 7    | 14               | 41.5  | 6       | 6      | 5    | 6    | 43.5 | 132  | 144     | 156  | 7       | 6   | 57.0      | 5 | 12   | 5                                    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 26               | 29   | 13   | 9    | 7             | 7     | 6       | 6      | 51.9 | 46.0 | 50.0 | 50.0 | 7       | 13 | 58.5    | 7    | 13               | 41.0  | 6       | 6      | 6    | 8.5  | 46.6 | 133  | 145     | 157  | 8       | 7.5 | 63.0      | 5 | 12   | 5                                    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 27               | 30   | 14   | 9    | 7             | 7     | 6       | 6.5    | 52.6 | 47.0 | 51.0 | 51.0 | 7       | 13 | 57.5    | 7    | 13               | 40.0  | 7       | 8      | 6    | 8    | 47.1 | 134  | 146     | 158  | 8       | 7.5 | 63.0      | 5 | 12   | 5                                    | 6    | 0  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 28               | 31   | 14   | 9    | 7             | 6.5   | 6       | 6.5    | 52.6 | 52.0 | 52.0 | 52.0 | 7       | 12 | 56.5    | 7    | 12               | 39.0  | 7       | 7.5    | 6    | 7.5  | 47.3 | 135  | 147     | 159  | 8       | 7   | 63.0      | 5 | 12   | 5                                    | 6    | 0  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 28               | 32   | 15   | 9    | 7             | 6     | 6       | 6.5    | 53.5 | 52.0 | 52.0 | 52.0 | 7       | 12 | 56.5    | 7    | 12               | 39.5  | 7       | 7.5    | 6    | 7.5  | 47.5 | 136  | 148     | 160  | 8       | 7   | 63.0      | 5 | 12   | 6                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 29               | 33   | 15   | 9    | 7             | 6     | 6       | 6.5    | 53.4 | 53.0 | 53.0 | 53.0 | 7       | 12 | 56.0    | 7    | 12               | 38.5  | 7       | 7.5    | 6    | 7    | 47.8 | 137  | 149     | 161  | 8       | 6.5 | 63.0      | 5 | 12   | 6                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 30               | 34   | 15   | 9    | 7             | 6     | 6       | 6      | 53.4 | 54.0 | 54.0 | 54.0 | 7       | 12 | 55.5    | 7    | 12               | 38.0  | 7       | 7.5    | 6    | 7    | 47.9 | 138  | 150     | 162  | 8       | 6.5 | 63.0      | 5 | 12   | 6                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 31               | 35   | 16   | 9    | 7             | 6     | 6       | 6.5    | 54.1 | 55.0 | 55.0 | 55.0 | 7       | 12 | 55.0    | 7    | 12               | 37.5  | 7       | 7      | 6    | 6.5  | 48.4 | 139  | 151     | 163  | 8       | 6.5 | 63.0      | 5 | 12   | 6                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 31               | 36   | 16   | 9    | 8             | 7.5   | 6       | 6      | 54.3 | 55.0 | 55.0 | 55.0 | 7       | 12 | 55.0    | 7    | 12               | 37.5  | 7       | 7      | 6    | 6.5  | 48.4 | 140  | 152     | 164  | 8       | 6.5 | 63.0      | 5 | 12   | 6                                    | 8    | 0  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 12 FT |                  |    |    |    |               |      |         |      |      |                        |         |      |         |       |         |    |                  |      |      |      |         |                        |         |      |         |      |           |      |      |    |     | HEIGHT (HT) = 12 FT OR 13 FT |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|------------------------|---------|------|---------|-------|---------|----|------------------|------|------|------|---------|------------------------|---------|------|---------|------|-----------|------|------|----|-----|------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                        |         |      |         |       |         |    | BOTTOM SLAB BARS |      |      |      |         |                        |         |      |         |      | WALL BARS |      |      |    |     |                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                        | H1 BARS |      | H2 BARS |       | A2 BARS |    | J4 BARS          |      |      |      | H3 BARS |                        | B1 BARS |      | B2 BARS |      |           |      |      |    |     |                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=12'<br>HT=13' | SIZE    | SPA. | C5      | SIZE  | SPA.    | C6 | SIZE             | SPA. | SIZE | SPA. | C4      | K3<br>HT=12'<br>HT=13' | SIZE    | SPA. | C7      | SIZE | SPA.      | SIZE | SPA. | G1 |     |                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 11 | 9  | 10 | 5             | 6    | 5       | 6.5  | 59.0 | 34.0                   | 34.0    | 5    | 12      | 118.0 | 5       | 12 | 32.5             | 5    | 7    | 6    | 6       | 88.9                   | 151     | 163  | 6       | 6.5  | 57.5      | 5    | 12   | 5  | 8.5 | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12 | 9  | 10 | 6             | 8    | 5       | 7    | 63.0 | 35.0                   | 35.0    | 6    | 16      | 122.0 | 6       | 16 | 39.5             | 5    | 7    | 6    | 6       | 83.6                   | 152     | 164  | 6       | 7    | 57.0      | 5    | 12   | 5  | 8.5 | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 12 | 9  | 10 | 6             | 8    | 6       | 7    | 63.0 | 35.0                   | 35.0    | 6    | 15      | 122.0 | 6       | 15 | 39.5             | 5    | 6.5  | 6    | 6       | 83.6                   | 152     | 164  | 6       | 6.5  | 57.0      | 5    | 12   | 5  | 8.5 | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 12 | 9  | 10 | 5             | 6.5  | 6       | 7    | 61.0 | 35.0                   | 35.0    | 6    | 15      | 120.0 | 6       | 15 | 37.0             | 5    | 6.5  | 6    | 6       | 76.5                   | 152     | 164  | 6       | 6.5  | 56.5      | 5    | 12   | 5  | 8.5 | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 12 | 9  | 10 | 5             | 7    | 6       | 6.5  | 73.5 | 35.0                   | 35.0    | 6    | 14      | 63.5  | 6       | 14 | 35.5             | 5    | 6    | 6    | 6       | 70.0                   | 152     | 164  | 6       | 6    | 55.5      | 5    | 12   | 5  | 8.5 | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11               | 13 | 10 | 10 | 5             | 7    | 6       | 7    | 63.9 | 31.0                   | 35.0    | 6    | 13      | 58.0  | 6       | 13 | 34.5             | 5    | 6    | 6    | 6.5     | 65.8                   | 153     | 165  | 6       | 6    | 55.0      | 5    | 12   | 5  | 8   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12               | 14 | 10 | 10 | 5             | 7    | 6       | 7    | 61.6 | 36.0                   | 36.0    | 6    | 12      | 56.5  | 6       | 12 | 34.5             | 6    | 8    | 6    | 6       | 63.1                   | 154     | 166  | 7       | 7    | 57.5      | 5    | 12   | 5  | 8   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 13               | 15 | 11 | 10 | 5             | 6.5  | 6       | 7.5  | 59.9 | 33.0                   | 37.0    | 6    | 12      | 55.0  | 6       | 12 | 34.0             | 6    | 7.5  | 6    | 6.5     | 61.4                   | 155     | 167  | 7       | 7    | 57.5      | 5    | 12   | 5  | 7.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 14               | 16 | 12 | 10 | 5             | 6    | 6       | 7.5  | 58.8 | 34.0                   | 38.0    | 6    | 12      | 54.5  | 6       | 12 | 34.0             | 6    | 7    | 6    | 7.5     | 60.0                   | 156     | 168  | 7       | 7    | 57.5      | 5    | 12   | 5  | 7   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 16               | 18 | 12 | 10 | 6             | 8    | 6       | 7    | 64.1 | 36.0                   | 40.0    | 6    | 12      | 60.0  | 6       | 12 | 40.0             | 6    | 7    | 6    | 7.5     | 59.5                   | 158     | 170  | 6       | 6    | 54.0      | 5    | 12   | 5  | 7   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 17               | 19 | 12 | 10 | 6             | 7.5  | 6       | 6.5  | 63.1 | 37.0                   | 41.0    | 6    | 12      | 59.5  | 6       | 12 | 39.5             | 6    | 7    | 6    | 6.5     | 58.5                   | 159     | 171  | 7       | 7    | 57.0      | 5    | 12   | 5  | 7   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 18               | 20 | 13 | 10 | 6             | 7    | 6       | 6.5  | 62.6 | 38.0                   | 42.0    | 6    | 12      | 58.5  | 6       | 12 | 39.5             | 6    | 6.5  | 6    | 7.5     | 57.9                   | 160     | 172  | 7       | 7    | 57.0      | 5    | 12   | 5  | 6.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 19               | 21 | 13 | 10 | 6             | 6.5  | 6       | 6.5  | 62.3 | 39.0                   | 43.0    | 7    | 16      | 63.0  | 7       | 16 | 44.5             | 6    | 6    | 6    | 6.5     | 57.5                   | 161     | 173  | 7       | 7    | 57.0      | 5    | 12   | 5  | 6.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 20               | 23 | 14 | 10 | 6             | 6.5  | 6       | 6.5  | 62.5 | 40.0                   | 44.0    | 7    | 16      | 62.5  | 7       | 16 | 44.0             | 6    | 6.5  | 6    | 7.5     | 57.8                   | 163     | 175  | 7       | 7    | 57.0      | 5    | 12   | 5  | 6   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 21               | 24 | 14 | 10 | 6             | 6    | 6       | 6    | 62.3 | 41.0                   | 45.0    | 7    | 15      | 62.0  | 7       | 15 | 44.0             | 6    | 6.5  | 6    | 7       | 57.6                   | 164     | 176  | 7       | 7    | 57.0      | 5    | 12   | 5  | 6   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 22               | 25 | 14 | 10 | 6             | 6    | 6       | 6    | 59.8 | 42.0                   | 46.0    | 7    | 15      | 61.0  | 7       | 15 | 43.5             | 6    | 6.5  | 6    | 7.5     | 55.1                   | 165     | 177  | 7       | 6.5  | 57.0      | 5    | 12   | 5  | 6   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 23               | 26 | 15 | 10 | 7             | 8    | 6       | 6    | 60.3 | 47.0                   | 47.0    | 7    | 15      | 60.0  | 7       | 15 | 42.5             | 6    | 6    | 6    | 7.5     | 55.4                   | 166     | 178  | 7       | 6.5  | 57.0      | 5    | 12   | 6  | 8   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 24               | 27 | 15 | 10 | 7             | 7.5  | 6       | 6    | 60.3 | 48.0                   | 48.0    | 7    | 14      | 59.5  | 7       | 14 | 42.0             | 6    | 6    | 6    | 7.5     | 55.5                   | 167     | 179  | 7       | 6    | 57.0      | 5    | 12   | 6  | 8   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 25               | 28 | 16 | 10 | 7             | 7.5  | 6       | 6    | 60.9 | 49.0                   | 49.0    | 7    | 14      | 58.5  | 7       | 14 | 41.0             | 6    | 6    | 6    | 7.5     | 55.8                   | 168     | 180  | 7       | 6    | 57.0      | 5    | 12   | 6  | 8   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 25               | 29 | 16 | 10 | 7             | 6.5  | 7       | 7.5  | 65.8 | 49.0                   | 49.0    | 7    | 13      | 58.5  | 7       | 13 | 41.5             | 6    | 6    | 6    | 7.5     | 55.8                   | 169     | 181  | 8       | 7.5  | 63.0      | 5    | 12   | 6  | 8   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 26               | 30 | 17 | 10 | 7             | 7    | 6       | 6    | 61.5 | 50.0                   | 50.0    | 7    | 13      | 57.5  | 7       | 13 | 40.5             | 7    | 7.5  | 6    | 7       | 56.1                   | 170     | 182  | 8       | 7.5  | 63.0      | 5    | 12   | 6  | 7.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 27               | 31 | 17 | 10 | 7             | 6.5  | 7       | 7.5  | 66.5 | 51.0                   | 51.0    | 7    | 13      | 57.0  | 7       | 13 | 40.0             | 7    | 7.5  | 6    | 7       | 56.3                   | 171     | 183  | 8       | 7    | 63.0      | 5    | 12   | 6  | 7.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 28               | 32 | 18 | 10 | 7             | 6.5  | 7       | 7.5  | 67.1 | 52.0                   | 52.0    | 7    | 12      | 56.5  | 7       | 12 | 39.0             | 7    | 7.5  | 6    | 6.5     | 56.6                   | 172     | 184  | 8       | 7    | 63.0      | 5    | 12   | 6  | 7   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 29               | 33 | 18 | 10 | 7             | 6.5  | 7       | 7    | 67.1 | 53.0                   | 53.0    | 7    | 12      | 56.0  | 7       | 12 | 38.0             | 7    | 7.5  | 6    | 6.5     | 56.9                   | 173     | 185  | 8       | 6.5  | 63.0      | 5    | 12   | 6  | 7   | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 29               | 34 | 19 | 10 | 7             | 6    | 7       | 7.5  | 67.9 | 53.0                   | 53.0    | 7    | 12      | 56.0  | 7       | 12 | 38.5             | 7    | 7.5  | 6    | 6.5     | 57.0                   | 174     | 186  | 8       | 6.5  | 63.0      | 5    | 12   | 6  | 6.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 30               | 35 | 19 | 10 | 7             | 6    | 7       | 6.5  | 67.9 | 54.0                   | 54.0    | 7    | 12      | 55.0  | 7       | 12 | 38.0             | 7    | 7    | 6    | 6.5     | 57.3                   | 175     | 187  | 8       | 6.5  | 63.0      | 5    | 12   | 6  | 6.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 31               | 36 | 20 | 10 | 7             | 6    | 7       | 7    | 68.6 | 55.0                   | 55.0    | 7    | 13      | 54.5  | 7       | 13 | 37.5             | 7    | 7    | 6    | 6.5     | 57.6                   | 176     | 188  | 8       | 6    | 63.0      | 5    | 12   | 6  | 6.5 | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 12 FT |                  |    |    |    |               |      |         |      |      |                     |         |      |         |       |         |      |                  |      |      |      |         |      |                     |     |         |      |           | HEIGHT (HT) = 14 FT OR 15 FT |      |      |      |    |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|---------------------|---------|------|---------|-------|---------|------|------------------|------|------|------|---------|------|---------------------|-----|---------|------|-----------|------------------------------|------|------|------|----|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                     |         |      |         |       |         |      | BOTTOM SLAB BARS |      |      |      |         |      |                     |     |         |      | WALL BARS |                              |      |      |      |    |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                     | H1 BARS |      | H2 BARS |       | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |      | B1 BARS             |     | B2 BARS |      |           |                              |      |      |      |    |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=14' HT=15' |         | SIZE | SPA.    | C5    | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4   | K3<br>HT=14' HT=15' |     | SIZE    | SPA. | C7        | SIZE                         | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |
| 1 FT             | 14               | 12 | 10 | 12 | 5             | 6    | 5       | 6    | 60.0 | 34.0                | 34.0    | 5    | 12      | 119.0 | 5       | 12   | 32.5             | 5    | 7    | 6    | 6       | 98.8 | 176                 | 188 | 6       | 7    | 58.0      | 5                            | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12 | 10 | 12 | 6             | 8    | 6       | 8    | 67.0 | 35.0                | 39.0    | 6    | 16      | 126.0 | 6       | 16   | 40.0             | 5    | 6.5  | 6    | 6       | 92.5 | 176                 | 188 | 6       | 6.5  | 57.0      | 5                            | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 13 | 10 | 12 | 6             | 8    | 6       | 6.5  | 67.0 | 35.0                | 39.0    | 6    | 16      | 126.0 | 6       | 16   | 40.0             | 5    | 6.5  | 6    | 6       | 92.5 | 177                 | 189 | 6       | 6.5  | 57.0      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 4 FT             | 11               | 13 | 10 | 12 | 5             | 6.5  | 6       | 6.5  | 62.0 | 35.0                | 35.0    | 6    | 16      | 121.0 | 6       | 16   | 37.5             | 5    | 6.5  | 6    | 6       | 89.8 | 177                 | 189 | 6       | 7    | 57.0      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 6 FT             | 11               | 13 | 11 | 12 | 5             | 7    | 6       | 7    | 83.8 | 31.0                | 35.0    | 6    | 15      | 61.0  | 6       | 15   | 36.0             | 5    | 6    | 6    | 6.5     | 81.4 | 177                 | 189 | 6       | 6.5  | 56.0      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 8 FT             | 11               | 13 | 12 | 12 | 5             | 7    | 6       | 7.5  | 73.9 | 35.0                | 35.0    | 6    | 13      | 57.5  | 6       | 13   | 35.0             | 5    | 6    | 6    | 6.5     | 76.1 | 177                 | 189 | 7       | 7    | 58.0      | 5                            | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |
| 10 FT            | 12               | 14 | 12 | 12 | 5             | 7    | 6       | 7    | 71.4 | 36.0                | 36.0    | 6    | 13      | 56.0  | 6       | 13   | 35.0             | 6    | 8    | 6    | 6.5     | 74.1 | 178                 | 190 | 7       | 7    | 58.0      | 5                            | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |
| 12 FT            | 13               | 15 | 13 | 12 | 5             | 6.5  | 6       | 7.5  | 68.8 | 37.0                | 37.0    | 6    | 13      | 55.0  | 6       | 13   | 34.5             | 6    | 7.5  | 6    | 6.5     | 71.6 | 179                 | 191 | 7       | 7    | 57.5      | 5                            | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |
| 14 FT            | 14               | 16 | 13 | 12 | 5             | 6    | 6       | 6.5  | 67.3 | 38.0                | 38.0    | 6    | 12      | 54.5  | 6       | 12   | 34.5             | 6    | 6.5  | 6    | 6       | 70.1 | 180                 | 192 | 7       | 7    | 57.5      | 5                            | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |
| 16 FT            | 15               | 18 | 14 | 12 | 6             | 8    | 6       | 6.5  | 72.1 | 39.0                | 39.0    | 6    | 12      | 60.0  | 6       | 12   | 40.5             | 6    | 7    | 6    | 6.5     | 69.5 | 182                 | 194 | 6       | 6    | 54.5      | 5                            | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |
| 18 FT            | 17               | 19 | 14 | 12 | 6             | 7.5  | 6       | 6    | 72.1 | 41.0                | 41.0    | 6    | 12      | 59.5  | 6       | 12   | 40.5             | 6    | 6.5  | 6    | 6       | 68.1 | 183                 | 195 | 6       | 6    | 54.5      | 5                            | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |
| 20 FT            | 18               | 20 | 15 | 12 | 6             | 7    | 6       | 6    | 71.5 | 42.0                | 42.0    | 6    | 12      | 59.0  | 6       | 12   | 40.0             | 6    | 6.5  | 6    | 6       | 67.1 | 184                 | 196 | 7       | 7    | 57.5      | 5                            | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |
| 22 FT            | 19               | 22 | 16 | 12 | 6             | 6.5  | 6       | 6    | 71.4 | 43.0                | 43.0    | 6    | 12      | 58.5  | 6       | 12   | 40.0             | 6    | 6.5  | 6    | 6       | 67.4 | 186                 | 198 | 7       | 7    | 57.5      | 5                            | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |
| 24 FT            | 20               | 23 | 16 | 12 | 6             | 6.5  | 6       | 6    | 71.3 | 44.0                | 44.0    | 6    | 12      | 58.0  | 6       | 12   | 40.0             | 6    | 6.5  | 6    | 6       | 67.1 | 187                 | 199 | 7       | 7    | 57.5      | 5                            | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |
| 26 FT            | 21               | 24 | 17 | 12 | 6             | 6    | 6       | 6    | 71.4 | 45.0                | 45.0    | 6    | 12      | 57.0  | 6       | 12   | 39.5             | 6    | 6    | 6    | 6       | 67.1 | 188                 | 200 | 7       | 7    | 57.5      | 5                            | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |
| 28 FT            | 22               | 25 | 17 | 12 | 6             | 6    | 6       | 6    | 69.1 | 46.0                | 46.0    | 7    | 15      | 61.5  | 7       | 15   | 44.0             | 6    | 6    | 6    | 6.5     | 64.9 | 189                 | 201 | 7       | 6.5  | 57.5      | 5                            | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |
| 30 FT            | 23               | 26 | 17 | 12 | 6             | 6    | 7       | 7.5  | 74.1 | 47.0                | 47.0    | 7    | 15      | 61.0  | 7       | 15   | 43.0             | 6    | 6    | 6    | 6.5     | 64.9 | 190                 | 202 | 7       | 6.5  | 57.5      | 5                            | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |
| 32 FT            | 23               | 27 | 17 | 12 | 7             | 7    | 7       | 6.5  | 74.0 | 47.0                | 47.0    | 7    | 14      | 61.0  | 7       | 14   | 44.0             | 6    | 6    | 6    | 6       | 65.0 | 191                 | 203 | 7       | 6    | 57.5      | 5                            | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |
| 34 FT            | 24               | 28 | 18 | 12 | 7             | 7    | 7       | 7    | 74.5 | 48.0                | 48.0    | 7    | 14      | 60.0  | 7       | 14   | 43.0             | 6    | 6    | 6    | 6       | 65.3 | 192                 | 204 | 7       | 6    | 57.5      | 5                            | 12   | 6    | 7    | 0  |  |  |  |  |  |  |  |
| 36 FT            | 25               | 29 | 19 | 12 | 7             | 7    | 7       | 7    | 75.0 | 49.0                | 49.0    | 7    | 14      | 59.0  | 7       | 14   | 42.0             | 7    | 7.5  | 6    | 6.5     | 65.5 | 193                 | 205 | 8       | 7.5  | 63.5      | 5                            | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |
| 38 FT            | 26               | 30 | 20 | 12 | 7             | 7    | 7       | 7.5  | 75.5 | 50.0                | 50.0    | 7    | 13      | 58.0  | 7       | 13   | 41.5             | 7    | 7.5  | 6    | 6       | 65.9 | 194                 | 206 | 8       | 7.5  | 63.5      | 5                            | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |
| 40 FT            | 27               | 31 | 20 | 12 | 7             | 7    | 7       | 6.5  | 75.6 | 51.0                | 51.0    | 7    | 13      | 57.5  | 7       | 13   | 40.5             | 7    | 7.5  | 6    | 6       | 66.0 | 195                 | 207 | 8       | 7    | 63.5      | 5                            | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |
| 42 FT            | 28               | 32 | 21 | 12 | 7             | 6.5  | 7       | 7    | 76.3 | 52.0                | 52.0    | 7    | 12      | 57.0  | 7       | 12   | 39.5             | 7    | 7    | 6    | 6       | 66.4 | 196                 | 208 | 8       | 7    | 63.5      | 5                            | 12   | 6    | 6    | 0  |  |  |  |  |  |  |  |
| 44 FT            | 28               | 33 | 22 | 12 | 7             | 6.5  | 7       | 7    | 76.6 | 52.0                | 58.0    | 7    | 12      | 57.0  | 7       | 12   | 40.0             | 7    | 7    | 7    | 7.5     | 69.6 | 197                 | 209 | 8       | 6.5  | 63.5      | 5                            | 12   | 6    | 6    | 0  |  |  |  |  |  |  |  |
| 46 FT            | 29               | 34 | 22 | 12 | 7             | 6.5  | 7       | 6    | 76.8 | 53.0                | 59.0    | 7    | 12      | 56.5  | 7       | 12   | 39.0             | 7    | 7    | 7    | 7.5     | 69.9 | 198                 | 210 | 8       | 6.5  | 63.5      | 5                            | 12   | 6    | 6    | 0  |  |  |  |  |  |  |  |
| 48 FT            | 30               | 35 | 24 | 12 | 7             | 6    | 7       | 7    | 78.0 | 54.0                | 60.0    | 7    | 12      | 56.0  | 7       | 12   | 39.0             | 7    | 7    | 7    | 7.5     | 70.4 | 199                 | 211 | 8       | 6.5  | 64.0      | 5                            | 12   | 6    | 6    | 0  |  |  |  |  |  |  |  |
| 50 FT            | 30               | 36 | 24 | 12 | 7             | 6    | 7       | 6    | 78.0 | 54.0                | 60.0    | 7    | 12      | 56.0  | 7       | 12   | 39.0             | 7    | 7    | 7    | 7.5     | 70.5 | 200                 | 212 | 8       | 6    | 64.0      | 5                            | 12   | 7    | 8    | 0  |  |  |  |  |  |  |  |



| SPAN (S) = 13 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |       |         |                  |      |         |      |         |      |      |       |       |       |         |      |           |         |      |         | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|-------|---------|------------------|------|---------|------|---------|------|------|-------|-------|-------|---------|------|-----------|---------|------|---------|------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |       |         |      | WALL BARS |         |      |         |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |       | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |       | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE    | SPA.                               | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=7' | HT=8' | HT=9' |         |      |       |         |                  |      |         |      |         |      |      | HT=7' | HT=8' | HT=9' |         |      |           |         |      |         |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 8  | 8  | 5             | 6    | 5       | 8.5  | 61.8 | 30.0  | 34.0  | 34.0  | 5       | 12   | 125.5 | 5       | 12               | 36.5 | 5       | 7    | 6       | 7    | 61.0 | 90    | 102   | 114   | 6       | 6    | 60.0      | 5       | 12   | 5       | 12                                 | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12 | 8  | 8  | 6             | 8    | 5       | 8    | 65.8 | 31.0  | 35.0  | 35.0  | 6       | 16   | 129.5 | 6       | 16               | 43.5 | 5       | 7    | 5       | 7    | 53.8 | 92    | 104   | 116   | 6       | 6.5  | 59.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 12 | 8  | 8  | 6             | 8    | 6       | 7    | 65.8 | 31.0  | 35.0  | 35.0  | 6       | 13   | 129.5 | 6       | 13               | 43.5 | 5       | 6.5  | 5       | 6    | 53.8 | 92    | 104   | 116   | 7       | 6.5  | 62.0      | 5       | 11   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 11 | 8  | 8  | 6             | 8    | 6       | 7    | 52.1 | 31.0  | 31.0  | 31.0  | 6       | 13   | 82.0  | 6       | 13               | 38.0 | 5       | 6.5  | 5       | 6    | 46.5 | 91    | 103   | 115   | 7       | 6.5  | 62.0      | 5       | 11   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12               | 12 | 8  | 8  | 5             | 6.5  | 5       | 6.5  | 44.1 | 32.0  | 32.0  | 32.0  | 6       | 13   | 68.0  | 6       | 13               | 36.5 | 5       | 6    | 5       | 6.5  | 42.8 | 92    | 104   | 116   | 7       | 6.5  | 61.0      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 13 | 8  | 8  | 5             | 6    | 5       | 6    | 41.5 | 32.0  | 32.0  | 32.0  | 7       | 16   | 65.0  | 7       | 16               | 38.5 | 5       | 6    | 5       | 6.5  | 40.0 | 93    | 105   | 117   | 7       | 6.5  | 60.5      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 15 | 8  | 8  | 5             | 6    | 5       | 6    | 39.5 | 29.0  | 33.0  | 33.0  | 7       | 15   | 63.0  | 7       | 15               | 38.0 | 6       | 7.5  | 5       | 8    | 38.0 | 95    | 107   | 119   | 7       | 7    | 60.5      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 15               | 16 | 8  | 8  | 6             | 8    | 5       | 6.5  | 42.4 | 35.0  | 35.0  | 35.0  | 7       | 16   | 70.0  | 7       | 16               | 46.0 | 6       | 7    | 5       | 7.5  | 37.1 | 96    | 108   | 120   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 11                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 16               | 17 | 8  | 8  | 6             | 8    | 5       | 6    | 41.1 | 36.0  | 36.0  | 36.0  | 7       | 15   | 69.0  | 7       | 15               | 46.0 | 6       | 7    | 5       | 7    | 36.1 | 97    | 109   | 121   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 10                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 17               | 18 | 8  | 8  | 6             | 7.5  | 5       | 6    | 40.1 | 37.0  | 37.0  | 37.0  | 7       | 14   | 68.5  | 7       | 14               | 45.5 | 6       | 6    | 5       | 6.5  | 35.4 | 98    | 110   | 122   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18               | 20 | 8  | 8  | 6             | 6.5  | 6       | 8    | 43.5 | 38.0  | 38.0  | 38.0  | 7       | 14   | 68.0  | 7       | 14               | 45.5 | 6       | 6.5  | 5       | 6    | 34.8 | 100   | 112   | 124   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 20               | 21 | 8  | 8  | 6             | 6.5  | 6       | 7.5  | 42.6 | 44.0  | 44.0  | 44.0  | 7       | 14   | 67.0  | 7       | 14               | 45.5 | 6       | 6    | 6       | 7.5  | 37.5 | 101   | 113   | 125   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 9                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 21               | 23 | 8  | 8  | 6             | 6    | 6       | 6.5  | 42.5 | 45.0  | 45.0  | 45.0  | 7       | 14   | 66.5  | 7       | 14               | 45.0 | 6       | 6    | 6       | 6.5  | 37.3 | 103   | 115   | 127   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 22               | 24 | 9  | 8  | 6             | 6    | 6       | 7.5  | 43.1 | 42.0  | 42.0  | 46.0  | 7       | 13   | 66.0  | 7       | 13               | 45.0 | 6       | 6    | 6       | 7    | 37.6 | 104   | 116   | 128   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 8.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 23               | 25 | 9  | 8  | 7             | 7.5  | 6       | 6.5  | 42.9 | 47.0  | 47.0  | 47.0  | 7       | 13   | 65.5  | 7       | 13               | 45.0 | 6       | 6    | 6       | 7    | 37.6 | 105   | 117   | 129   | 7       | 6.5  | 60.0      | 5       | 12   | 5       | 8.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 24               | 26 | 9  | 8  | 7             | 7.5  | 6       | 7    | 41.3 | 48.0  | 48.0  | 48.0  | 7       | 13   | 64.5  | 7       | 13               | 44.5 | 7       | 8    | 6       | 6.5  | 36.1 | 106   | 118   | 130   | 7       | 6.5  | 59.5      | 5       | 12   | 5       | 8.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 25               | 27 | 9  | 8  | 7             | 7    | 6       | 6    | 41.3 | 49.0  | 49.0  | 49.0  | 7       | 13   | 64.0  | 7       | 13               | 44.5 | 7       | 7.5  | 6       | 6.5  | 36.3 | 107   | 119   | 131   | 7       | 6    | 59.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 26               | 29 | 10 | 8  | 7             | 7    | 6       | 7    | 42.3 | 50.0  | 50.0  | 50.0  | 7       | 13   | 63.5  | 7       | 13               | 44.0 | 7       | 8    | 6       | 6.5  | 36.9 | 109   | 121   | 133   | 8       | 7.5  | 65.5      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 27               | 30 | 10 | 8  | 7             | 6.5  | 6       | 6.5  | 42.3 | 51.0  | 51.0  | 51.0  | 7       | 13   | 62.5  | 7       | 13               | 43.5 | 7       | 7.5  | 6       | 6.5  | 37.0 | 110   | 122   | 134   | 8       | 7.5  | 65.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 28               | 31 | 11 | 8  | 7             | 6.5  | 6       | 7.5  | 43.1 | 52.0  | 52.0  | 52.0  | 7       | 12   | 62.0  | 7       | 12               | 42.5 | 7       | 7.5  | 6       | 7    | 37.5 | 111   | 123   | 135   | 8       | 7    | 65.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 29               | 32 | 11 | 8  | 7             | 6    | 6       | 7    | 43.1 | 53.0  | 53.0  | 53.0  | 7       | 12   | 61.0  | 7       | 12               | 41.5 | 7       | 7.5  | 6       | 6.5  | 37.6 | 112   | 124   | 136   | 8       | 7    | 65.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 30               | 33 | 11 | 8  | 7             | 6    | 6       | 7    | 43.1 | 54.0  | 54.0  | 54.0  | 7       | 12   | 60.0  | 7       | 12               | 41.0 | 7       | 7    | 6       | 6.5  | 37.9 | 113   | 125   | 137   | 8       | 6.5  | 65.5      | 5       | 12   | 5       | 7                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 31               | 34 | 12 | 8  | 7             | 6    | 6       | 7.5  | 44.0 | 55.0  | 55.0  | 55.0  | 8       | 15   | 67.0  | 8       | 15               | 48.0 | 7       | 7    | 6       | 7    | 38.4 | 114   | 126   | 138   | 8       | 6.5  | 65.5      | 5       | 12   | 5       | 7                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 32               | 35 | 12 | 8  | 8             | 7.5  | 6       | 7    | 44.0 | 56.0  | 56.0  | 56.0  | 8       | 14   | 66.5  | 8       | 14               | 47.0 | 7       | 7    | 6       | 6.5  | 38.5 | 115   | 127   | 139   | 8       | 6.5  | 65.5      | 5       | 12   | 5       | 7                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 33               | 36 | 12 | 8  | 8             | 7    | 6       | 7    | 44.0 | 57.0  | 57.0  | 57.0  | 8       | 14   | 66.0  | 8       | 14               | 46.0 | 7       | 7    | 6       | 6.5  | 38.8 | 116   | 128   | 140   | 8       | 6    | 65.5      | 5       | 12   | 5       | 6.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 33               | 37 | 12 | 8  | 8             | 6.5  | 6       | 7    | 44.0 | 57.0  | 57.0  | 57.0  | 8       | 13   | 66.0  | 8       | 13               | 46.5 | 7       | 6.5  | 6       | 6.5  | 38.8 | 117   | 129   | 141   | 8       | 6    | 65.5      | 5       | 12   | 5       | 6.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 34               | 38 | 12 | 8  | 8             | 7    | 6       | 6    | 44.0 | 58.0  | 58.0  | 58.0  | 8       | 14   | 65.0  | 8       | 14               | 46.0 | 7       | 6.5  | 6       | 6    | 39.0 | 118   | 130   | 142   | 8       | 6    | 65.5      | 5       | 12   | 5       | 6                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 13 FT |                  |      |      |      |               |        |         |        |      |      |      |      |         |    |         |      |                  |        |         |        |      |      |      |      |         |      |         |      |           | HEIGHT (HT) = 10 FT OR 11 FT OR 12 FT |      |     |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|------|------|------|---------------|--------|---------|--------|------|------|------|------|---------|----|---------|------|------------------|--------|---------|--------|------|------|------|------|---------|------|---------|------|-----------|---------------------------------------|------|-----|-----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |        |         |        |      |      |      |      |         |    |         |      | BOTTOM SLAB BARS |        |         |        |      |      |      |      |         |      |         |      | WALL BARS |                                       |      |     |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      | A1 BARS       |        | J3 BARS |        |      |      |      |      | H1 BARS |    | H2 BARS |      | A2 BARS          |        | J4 BARS |        |      |      |      |      | H3 BARS |      | B1 BARS |      | B2 BARS   |                                       |      |     |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA. | C1            | K2     |         |        | SIZE | SPA. | C5   | SIZE | SPA.    | C6 | SIZE    | SPA. | C4               | K3     |         |        | SIZE | SPA. | C7   | SIZE | SPA.    | SIZE | SPA.    | G1   |           |                                       |      |     |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      |               | HT=10' | HT=11'  | HT=12' |      |      |      |      |         |    |         |      |                  | HT=10' | HT=11'  | HT=12' |      |      |      |      |         |      |         |      |           |                                       |      |     |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 11   | 9    | 10   | 5             | 6      | 5       | 7.5    | 62.6 | 34.0 | 34.0 | 34.0 | 5       | 12 | 126.5   | 5    | 12               | 36.5   | 5       | 6.5    | 6    | 6.5  | 81.1 | 127  | 139     | 151  | 6       | 6.5  | 60.5      | 5                                     | 11.5 | 5   | 9.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12   | 9    | 10   | 6             | 8      | 5       | 7.5    | 66.6 | 35.0 | 35.0 | 35.0 | 6       | 16 | 130.5   | 6    | 16               | 43.5   | 5       | 6.5    | 6    | 6.5  | 75.6 | 128  | 140     | 152  | 6       | 6.5  | 60.0      | 5                                     | 12   | 5   | 9   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 12   | 9    | 10   | 6             | 8      | 6       | 7      | 78.5 | 35.0 | 35.0 | 35.0 | 6       | 13 | 130.5   | 6    | 13               | 43.5   | 5       | 6.5    | 6    | 6    | 75.6 | 128  | 140     | 152  | 7       | 6.5  | 62.0      | 5                                     | 9    | 5   | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 11   | 9    | 10   | 6             | 8      | 6       | 7      | 78.5 | 35.0 | 35.0 | 35.0 | 6       | 13 | 84.0    | 6    | 13               | 38.0   | 5       | 6.5    | 6    | 6    | 66.3 | 127  | 139     | 151  | 7       | 6.5  | 62.0      | 5                                     | 9    | 5   | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12               | 12   | 9    | 10   | 5             | 6.5    | 6       | 6.5    | 63.6 | 32.0 | 36.0 | 36.0 | 6       | 13 | 67.0    | 6    | 13               | 37.0   | 5       | 6      | 6    | 61.5 | 128  | 140  | 152     | 7    | 6.5     | 61.5 | 5         | 12                                    | 5    | 8.5 | 12  |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 14   | 9    | 10   | 5             | 6      | 6       | 6.5    | 58.3 | 32.0 | 32.0 | 36.0 | 6       | 12 | 61.5    | 6    | 12               | 36.0   | 6       | 8      | 6    | 6.5  | 59.1 | 130  | 142     | 154  | 7       | 7    | 61.0      | 5                                     | 12   | 5   | 8.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 15   | 9    | 10   | 5             | 6      | 6       | 6      | 55.4 | 33.0 | 33.0 | 37.0 | 7       | 15 | 63.0    | 7    | 15               | 38.5   | 6       | 7.5    | 6    | 6.5  | 56.6 | 131  | 143     | 155  | 7       | 7    | 61.0      | 5                                     | 12   | 5   | 8.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14               | 16   | 10   | 10   | 5             | 6      | 6       | 6.5    | 53.6 | 34.0 | 34.0 | 38.0 | 7       | 15 | 61.5    | 7    | 15               | 38.5   | 6       | 7      | 6    | 7    | 54.6 | 132  | 144     | 156  | 7       | 6.5  | 60.5      | 5                                     | 12   | 5   | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 16               | 17   | 10   | 10   | 6             | 8      | 6       | 7      | 58.0 | 36.0 | 36.0 | 40.0 | 7       | 15 | 69.0    | 7    | 15               | 46.5   | 6       | 7      | 6    | 6.5  | 53.3 | 133  | 145     | 157  | 7       | 6.5  | 60.5      | 5                                     | 12   | 5   | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 17               | 19   | 11   | 10   | 6             | 7.5    | 6       | 7      | 57.5 | 37.0 | 37.0 | 41.0 | 7       | 15 | 68.5    | 7    | 15               | 46.0   | 6       | 6.5    | 6    | 8    | 52.4 | 135  | 147     | 159  | 7       | 7    | 60.5      | 5                                     | 12   | 5   | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18               | 20   | 12   | 10   | 6             | 7      | 6       | 7.5    | 57.4 | 38.0 | 38.0 | 38.0 | 7       | 14 | 68.0    | 7    | 14               | 46.0   | 6       | 6.5    | 5    | 6    | 48.8 | 136  | 148     | 160  | 7       | 6.5  | 60.5      | 5                                     | 12   | 5   | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 19               | 21   | 12   | 10   | 6             | 6.5    | 6       | 7      | 56.6 | 39.0 | 39.0 | 43.0 | 7       | 14 | 67.5    | 7    | 14               | 46.0   | 6       | 6      | 6    | 8    | 51.1 | 137  | 149     | 161  | 7       | 6.5  | 60.5      | 5                                     | 12   | 5   | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 21               | 23   | 12   | 10   | 6             | 6      | 6       | 6.5    | 56.1 | 41.0 | 41.0 | 45.0 | 7       | 14 | 66.5    | 7    | 14               | 45.5   | 6       | 6      | 6    | 7.5  | 51.0 | 139  | 151     | 163  | 7       | 6.5  | 60.5      | 5                                     | 12   | 5   | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 22               | 24   | 13   | 10   | 6             | 6      | 6       | 7      | 56.5 | 42.0 | 42.0 | 46.0 | 7       | 14 | 66.0    | 7    | 14               | 45.5   | 6       | 6      | 6    | 8    | 51.1 | 140  | 152     | 164  | 7       | 6.5  | 60.5      | 5                                     | 12   | 5   | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 23               | 25   | 13   | 10   | 7             | 7.5    | 6       | 6.5    | 56.3 | 43.0 | 43.0 | 47.0 | 7       | 14 | 65.5    | 7    | 14               | 45.5   | 7       | 7.5    | 6    | 7.5  | 51.0 | 141  | 153     | 165  | 7       | 6.5  | 60.5      | 5                                     | 12   | 5   | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 24               | 26   | 13   | 10   | 7             | 7.5    | 6       | 6.5    | 54.4 | 44.0 | 44.0 | 48.0 | 7       | 14 | 64.5    | 7    | 14               | 45.0   | 7       | 7.5    | 6    | 8    | 49.1 | 142  | 154     | 166  | 7       | 6.5  | 60.0      | 5                                     | 12   | 5   | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 25               | 28   | 13   | 10   | 7             | 7      | 6       | 6      | 54.4 | 45.0 | 45.0 | 49.0 | 7       | 14 | 64.0    | 7    | 14               | 45.0   | 7       | 8      | 6    | 8    | 49.3 | 144  | 156     | 168  | 7       | 6    | 60.0      | 5                                     | 12   | 5   | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 26               | 29   | 14   | 10   | 7             | 7      | 6       | 6.5    | 55.1 | 46.0 | 50.0 | 50.0 | 7       | 13 | 63.5    | 7    | 13               | 44.0   | 7       | 7.5    | 6    | 8.5  | 49.8 | 145  | 157     | 169  | 8       | 7.5  | 66.0      | 5                                     | 12   | 5   | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 27               | 30   | 14   | 10   | 7             | 6.5    | 6       | 6      | 55.0 | 47.0 | 51.0 | 51.0 | 7       | 13 | 62.5    | 7    | 13               | 43.0   | 7       | 7.5    | 6    | 8    | 49.8 | 146  | 158     | 170  | 8       | 7.5  | 66.0      | 5                                     | 12   | 5   | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 28               | 31   | 15   | 10   | 7             | 6.5    | 6       | 6.5    | 55.8 | 52.0 | 52.0 | 52.0 | 7       | 12 | 61.5    | 7    | 12               | 42.5   | 7       | 7      | 6    | 7.5  | 50.3 | 147  | 159     | 171  | 8       | 7    | 66.0      | 5                                     | 12   | 6   | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 29               | 32   | 15   | 10   | 7             | 6      | 6       | 6      | 55.6 | 53.0 | 53.0 | 53.0 | 7       | 12 | 60.5    | 7    | 12               | 41.5   | 7       | 7      | 6    | 7.5  | 50.4 | 148  | 160     | 172  | 8       | 7    | 66.0      | 5                                     | 12   | 6   | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 30               | 33   | 16   | 10   | 7             | 6      | 6       | 6      | 56.4 | 54.0 | 54.0 | 54.0 | 7       | 12 | 59.5    | 7    | 12               | 41.0   | 7       | 6.5    | 6    | 7    | 50.8 | 149  | 161     | 173  | 8       | 6.5  | 66.0      | 5                                     | 12   | 6   | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 31               | 35   | 16   | 10   | 7             | 6      | 6       | 6      | 56.5 | 55.0 | 55.0 | 55.0 | 8       | 15 | 67.0    | 8    | 15               | 48.0   | 7       | 7      | 6    | 6.5  | 51.0 | 151  | 163     | 175  | 8       | 6.5  | 66.0      | 5                                     | 12   | 6   | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 31               | 35   | 16   | 10   | 8             | 7      | 7       | 7.5    | 61.4 | 55.0 | 55.0 | 55.0 | 8       | 14 | 67.0    | 8    | 14               | 48.5   | 7       | 6      | 6    | 6.5  | 50.9 | 151  | 163     | 175  | 8       | 6.5  | 66.0      | 5                                     | 12   | 6   | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 32               | 36   | 17   | 10   | 8             | 7.5    | 6       | 6      | 57.1 | 56.0 | 56.0 | 56.0 | 8       | 14 | 66.5    | 8    | 14               | 47.5   | 7       | 6      | 6    | 6.5  | 51.4 | 152  | 164     | 176  | 8       | 6    | 66.0      | 5                                     | 12   | 6   | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 33               | 37   | 17   | 10   | 8             | 7      | 7       | 7.5    | 62.1 | 57.0 | 57.0 | 57.0 | 8       | 14 | 66.0    | 8    | 14               | 47.0   | 7       | 6      | 6    | 6.5  | 51.5 | 153  | 165     | 177  | 8       | 6    | 66.0      | 5                                     | 12   | 6   | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 34               | 38   | 17   | 10   | 8             | 7      | 7       | 7      | 62.1 | 58.0 | 58.0 | 58.0 | 8       | 14 | 65.5    | 8    | 14               | 46.5   | 7       | 6      | 6    | 6    | 51.8 | 154  | 166     | 178  | 8       | 6    | 66.0      | 5                                     | 12   | 6   | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 13 FT |                  |    |    |    |               |      |         |      |      |                        |         |      |         |       |         |      |                  |      |      |      |         |      |                        |     |         |      |           |      |      |      |      | HEIGHT (HT) = 13 FT OR 14 FT |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|------------------------|---------|------|---------|-------|---------|------|------------------|------|------|------|---------|------|------------------------|-----|---------|------|-----------|------|------|------|------|------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                        |         |      |         |       |         |      | BOTTOM SLAB BARS |      |      |      |         |      |                        |     |         |      | WALL BARS |      |      |      |      |                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                        | H1 BARS |      | H2 BARS |       | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |      | B1 BARS                |     | B2 BARS |      |           |      |      |      |      |                              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=13'<br>HT=14' |         | SIZE | SPA.    | C5    | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4   | K3<br>HT=13'<br>HT=14' |     | SIZE    | SPA. | C7        | SIZE | SPA. | SIZE | SPA. | G1                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 11 | 11 | 11 | 5             | 6    | 5       | 7    | 64.1 | 34.0                   | 34.0    | 5    | 12      | 127.5 | 5       | 12   | 36.5             | 5    | 6.5  | 5    | 6       | 85.3 | 163                    | 175 | 6       | 6    | 60.5      | 5    | 12   | 5    | 8    | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12 | 11 | 11 | 6             | 8    | 5       | 7    | 68.1 | 35.0                   | 35.0    | 6    | 16      | 131.5 | 6       | 16   | 43.5             | 5    | 6.5  | 5    | 6       | 80.9 | 164                    | 176 | 6       | 6.5  | 60.0      | 5    | 12   | 5    | 7.5  | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 12 | 11 | 11 | 6             | 8    | 5       | 6    | 92.9 | 35.0                   | 35.0    | 6    | 13      | 131.5 | 6       | 13   | 43.5             | 5    | 6    | 5    | 6       | 80.9 | 164                    | 176 | 7       | 7    | 62.5      | 5    | 11.5 | 5    | 7.5  | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 12 | 11 | 11 | 5             | 6    | 5       | 6    | 92.9 | 31.0                   | 31.0    | 6    | 13      | 82.5  | 6       | 13   | 38.0             | 5    | 6    | 5    | 6       | 75.5 | 164                    | 176 | 7       | 7    | 62.5      | 5    | 11.5 | 5    | 7.5  | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 12 | 11 | 11 | 5             | 6    | 6       | 7.5  | 74.6 | 31.0                   | 35.0    | 6    | 12      | 64.5  | 6       | 12   | 37.0             | 5    | 6    | 6    | 6.5     | 72.1 | 164                    | 176 | 7       | 6.5  | 61.5      | 5    | 12   | 5    | 7.5  | 12                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 14 | 11 | 11 | 5             | 6.5  | 6       | 7.5  | 68.5 | 32.0                   | 36.0    | 6    | 12      | 61.5  | 6       | 12   | 36.5             | 6    | 8    | 6    | 7       | 70.1 | 166                    | 178 | 7       | 7    | 61.5      | 5    | 12   | 5    | 7.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 15 | 11 | 11 | 5             | 6.5  | 6       | 7    | 65.9 | 37.0                   | 37.0    | 6    | 12      | 59.5  | 6       | 12   | 36.0             | 6    | 7.5  | 6    | 6.5     | 67.4 | 167                    | 179 | 7       | 6.5  | 61.0      | 5    | 12   | 5    | 7.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14               | 16 | 12 | 11 | 5             | 6    | 6       | 7    | 64.0 | 38.0                   | 38.0    | 7    | 15      | 61.5  | 7       | 15   | 38.5             | 6    | 7    | 6    | 7       | 65.5 | 168                    | 180 | 7       | 6.5  | 60.5      | 5    | 12   | 5    | 7    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15               | 17 | 12 | 11 | 6             | 7.5  | 6       | 6.5  | 68.5 | 39.0                   | 39.0    | 7    | 15      | 69.0  | 7       | 15   | 46.5             | 6    | 6.5  | 6    | 6       | 64.1 | 169                    | 181 | 7       | 6.5  | 60.5      | 5    | 12   | 5    | 7    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 17               | 19 | 13 | 11 | 6             | 7.5  | 6       | 6.5  | 68.0 | 41.0                   | 41.0    | 7    | 15      | 68.0  | 7       | 15   | 46.5             | 6    | 6.5  | 6    | 7       | 63.4 | 171                    | 183 | 7       | 6.5  | 60.5      | 5    | 12   | 5    | 6.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18               | 20 | 13 | 11 | 6             | 7    | 6       | 6    | 66.9 | 42.0                   | 42.0    | 7    | 15      | 67.5  | 7       | 15   | 46.5             | 6    | 6    | 6    | 6       | 62.4 | 172                    | 184 | 7       | 6.5  | 60.5      | 5    | 12   | 5    | 6.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 19               | 22 | 14 | 11 | 6             | 6.5  | 6       | 6    | 66.5 | 43.0                   | 43.0    | 7    | 14      | 67.0  | 7       | 14   | 46.0             | 6    | 6    | 6    | 7       | 62.0 | 174                    | 186 | 7       | 7    | 60.5      | 5    | 12   | 5    | 6    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 20               | 23 | 14 | 11 | 6             | 6    | 7       | 8    | 70.6 | 44.0                   | 44.0    | 7    | 14      | 66.5  | 7       | 14   | 46.0             | 6    | 6    | 6    | 6       | 61.3 | 175                    | 187 | 7       | 6.5  | 60.5      | 5    | 12   | 5    | 6    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 22               | 25 | 15 | 11 | 6             | 6    | 6       | 6    | 66.1 | 46.0                   | 46.0    | 7    | 15      | 65.5  | 7       | 15   | 45.5             | 6    | 6    | 6    | 7       | 61.5 | 177                    | 189 | 7       | 6.5  | 60.5      | 5    | 12   | 6    | 8    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 23               | 25 | 15 | 11 | 7             | 7.5  | 7       | 7.5  | 70.6 | 47.0                   | 47.0    | 7    | 14      | 65.0  | 7       | 14   | 45.5             | 7    | 7    | 6    | 6       | 60.9 | 177                    | 189 | 7       | 6.5  | 60.5      | 5    | 12   | 6    | 8    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 24               | 27 | 16 | 11 | 7             | 7.5  | 7       | 8    | 71.0 | 48.0                   | 48.0    | 7    | 14      | 64.5  | 7       | 14   | 45.0             | 7    | 8    | 6    | 7       | 61.3 | 179                    | 191 | 7       | 6    | 60.5      | 5    | 12   | 6    | 8    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 25               | 28 | 16 | 11 | 7             | 7    | 7       | 8    | 68.5 | 49.0                   | 49.0    | 7    | 14      | 63.5  | 7       | 14   | 44.0             | 7    | 7.5  | 6    | 7       | 58.9 | 180                    | 192 | 7       | 6    | 60.5      | 5    | 12   | 6    | 8    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 26               | 29 | 16 | 11 | 7             | 7    | 7       | 7.5  | 68.4 | 50.0                   | 50.0    | 7    | 13      | 62.5  | 7       | 13   | 43.5             | 7    | 7.5  | 6    | 6.5     | 58.9 | 181                    | 193 | 8       | 7.5  | 66.5      | 5    | 12   | 6    | 8    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 27               | 30 | 17 | 11 | 7             | 6.5  | 7       | 7.5  | 69.0 | 51.0                   | 51.0    | 7    | 13      | 61.5  | 7       | 13   | 42.5             | 7    | 7.5  | 6    | 7       | 59.1 | 182                    | 194 | 8       | 7.5  | 66.5      | 5    | 12   | 6    | 7.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 27               | 31 | 17 | 11 | 7             | 6    | 7       | 6.5  | 68.9 | 51.0                   | 51.0    | 7    | 12      | 61.5  | 7       | 12   | 43.5             | 7    | 7    | 6    | 7       | 59.1 | 183                    | 195 | 8       | 7    | 66.5      | 5    | 12   | 6    | 7.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 28               | 33 | 18 | 11 | 7             | 6    | 7       | 7    | 69.8 | 52.0                   | 52.0    | 7    | 12      | 60.0  | 7       | 12   | 42.5             | 7    | 7    | 6    | 6.5     | 59.6 | 185                    | 197 | 8       | 6.5  | 66.5      | 5    | 12   | 6    | 7    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 29               | 34 | 19 | 11 | 7             | 6    | 7       | 7    | 70.4 | 53.0                   | 53.0    | 7    | 12      | 59.5  | 7       | 12   | 41.5             | 7    | 7    | 6    | 6.5     | 60.0 | 186                    | 198 | 8       | 6.5  | 66.5      | 5    | 12   | 6    | 6.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 30               | 35 | 19 | 11 | 7             | 6    | 7       | 6.5  | 70.4 | 54.0                   | 54.0    | 7    | 12      | 59.0  | 7       | 12   | 40.5             | 7    | 7    | 6    | 6.5     | 60.1 | 187                    | 199 | 8       | 6.5  | 66.5      | 5    | 12   | 6    | 6.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 31               | 36 | 20 | 11 | 7             | 6    | 7       | 7    | 71.0 | 55.0                   | 55.0    | 8    | 15      | 66.5  | 8       | 15   | 47.5             | 7    | 7    | 6    | 6       | 60.5 | 188                    | 200 | 8       | 6    | 66.5      | 5    | 12   | 6    | 6.5  | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 32               | 37 | 21 | 11 | 8             | 7.5  | 7       | 7    | 71.8 | 56.0                   | 56.0    | 8    | 15      | 66.0  | 8       | 15   | 47.0             | 7    | 6.5  | 6    | 6       | 60.8 | 189                    | 201 | 8       | 6    | 66.5      | 5    | 12   | 6    | 6    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 32               | 38 | 21 | 11 | 8             | 7    | 7       | 6    | 71.8 | 56.0                   | 56.0    | 8    | 14      | 66.0  | 8       | 14   | 47.0             | 7    | 6.5  | 6    | 6       | 60.9 | 190                    | 202 | 8       | 6    | 66.5      | 5    | 12   | 6    | 6    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 33               | 39 | 22 | 11 | 8             | 7    | 7       | 6.5  | 72.5 | 57.0                   | 57.0    | 8    | 15      | 65.5  | 8       | 15   | 47.0             | 7    | 6.5  | 6    | 6       | 61.3 | 191                    | 203 | 8       | 6    | 66.5      | 5    | 12   | 6    | 6    | 0                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 13 FT |                     |    |    |    |               |      |         |      |       |                     |         |      |         |       |         |      |                  |      |      |      |         |      |                     |     |         |      |           |      | HEIGHT (HT) = 15 FT OR 16 FT |      |      |    |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|-------|---------------------|---------|------|---------|-------|---------|------|------------------|------|------|------|---------|------|---------------------|-----|---------|------|-----------|------|------------------------------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |       |                     |         |      |         |       |         |      | BOTTOM SLAB BARS |      |      |      |         |      |                     |     |         |      | WALL BARS |      |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |       |                     | H1 BARS |      | H2 BARS |       | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |      | B1 BARS             |     | B2 BARS |      |           |      |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1    | K2<br>HT=15' HT=16' |         | SIZE | SPA.    | C5    | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4   | K3<br>HT=15' HT=16' |     | SIZE    | SPA. | C7        | SIZE | SPA.                         | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14                  | 12 | 12 | 13 | 5             | 6    | 5       | 6    | 65.0  | 34.0                | 34.0    | 5    | 12      | 128.5 | 5       | 12   | 36.0             | 5    | 6.5  | 6    | 7       | 99.8 | 188                 | 200 | 6       | 6.5  | 61.0      | 5    | 12                           | 5    | 7    | 12 |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15                  | 13 | 12 | 13 | 6             | 8    | 6       | 8.5  | 72.0  | 35.0                | 39.0    | 6    | 16      | 135.5 | 6       | 16   | 43.5             | 5    | 6.5  | 6    | 7       | 96.4 | 189                 | 201 | 6       | 6.5  | 60.5      | 5    | 12                           | 5    | 7    | 12 |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 15                  | 13 | 12 | 13 | 6             | 8    | 6       | 7    | 115.0 | 35.0                | 39.0    | 6    | 14      | 135.5 | 6       | 14   | 43.5             | 5    | 6    | 6    | 6.5     | 96.4 | 189                 | 201 | 6       | 6    | 60.5      | 5    | 12                           | 5    | 7    | 12 |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11                  | 13 | 12 | 13 | 5             | 6    | 6       | 7    | 115.0 | 35.0                | 35.0    | 6    | 14      | 81.0  | 6       | 14   | 38.5             | 5    | 6    | 6    | 6.5     | 91.6 | 189                 | 201 | 6       | 6    | 60.5      | 5    | 12                           | 5    | 7    | 12 |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11                  | 13 | 12 | 13 | 5             | 6.5  | 6       | 6.5  | 84.8  | 35.0                | 35.0    | 6    | 13      | 63.5  | 6       | 13   | 37.5             | 5    | 6    | 6    | 6       | 84.8 | 189                 | 201 | 7       | 7    | 62.0      | 5    | 12                           | 5    | 6.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12                  | 14 | 13 | 13 | 5             | 6.5  | 6       | 7    | 78.8  | 36.0                | 36.0    | 6    | 13      | 61.0  | 6       | 13   | 37.0             | 6    | 8    | 6    | 6.5     | 80.6 | 190                 | 202 | 7       | 7    | 61.5      | 5    | 12                           | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13                  | 15 | 13 | 13 | 5             | 6.5  | 6       | 7    | 75.9  | 37.0                | 37.0    | 6    | 12      | 59.5  | 6       | 12   | 36.5             | 6    | 7.5  | 6    | 6.5     | 78.4 | 191                 | 203 | 7       | 6.5  | 61.0      | 5    | 12                           | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14                  | 16 | 14 | 13 | 5             | 6    | 6       | 7    | 72.9  | 38.0                | 38.0    | 6    | 12      | 58.5  | 6       | 12   | 36.5             | 6    | 6.5  | 6    | 6.5     | 75.6 | 192                 | 204 | 7       | 6.5  | 61.0      | 5    | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15                  | 18 | 14 | 13 | 6             | 8    | 6       | 6    | 77.1  | 39.0                | 39.0    | 7    | 16      | 69.0  | 7       | 16   | 47.0             | 6    | 6.5  | 6    | 6       | 75.3 | 194                 | 206 | 7       | 7    | 61.0      | 5    | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 16                  | 19 | 15 | 13 | 6             | 7.5  | 6       | 6    | 76.0  | 40.0                | 40.0    | 7    | 15      | 68.0  | 7       | 15   | 47.0             | 6    | 6.5  | 6    | 6       | 73.3 | 195                 | 207 | 7       | 6.5  | 61.0      | 5    | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18                  | 20 | 16 | 13 | 6             | 7    | 6       | 6    | 76.0  | 42.0                | 42.0    | 7    | 15      | 67.5  | 7       | 15   | 47.0             | 6    | 6    | 6    | 6       | 71.6 | 196                 | 208 | 7       | 6.5  | 61.0      | 5    | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 19                  | 22 | 16 | 13 | 6             | 6.5  | 7       | 8    | 80.4  | 43.0                | 49.0    | 7    | 15      | 67.5  | 7       | 15   | 47.0             | 6    | 6    | 7    | 7.5     | 74.5 | 198                 | 210 | 7       | 7    | 61.0      | 5    | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 20                  | 23 | 17 | 13 | 6             | 6.5  | 7       | 8    | 79.9  | 44.0                | 50.0    | 7    | 14      | 67.0  | 7       | 14   | 46.5             | 6    | 6    | 7    | 7.5     | 73.9 | 199                 | 211 | 7       | 6.5  | 61.0      | 5    | 12                           | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 21                  | 24 | 17 | 13 | 6             | 6    | 7       | 7.5  | 79.6  | 45.0                | 51.0    | 7    | 14      | 66.5  | 7       | 14   | 46.5             | 7    | 7    | 7    | 7       | 73.6 | 200                 | 212 | 7       | 6.5  | 61.0      | 5    | 12                           | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 23                  | 26 | 18 | 13 | 7             | 7.5  | 7       | 7.5  | 80.1  | 47.0                | 53.0    | 7    | 15      | 65.5  | 7       | 15   | 46.0             | 7    | 8    | 7    | 8       | 73.9 | 202                 | 214 | 7       | 6.5  | 61.0      | 5    | 12                           | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 23                  | 27 | 19 | 13 | 7             | 7.5  | 7       | 7.5  | 80.0  | 47.0                | 47.0    | 7    | 14      | 65.0  | 7       | 14   | 46.0             | 7    | 7.5  | 6    | 6       | 70.9 | 203                 | 215 | 7       | 6    | 61.0      | 5    | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 24                  | 28 | 19 | 13 | 7             | 7.5  | 7       | 7.5  | 77.8  | 48.0                | 48.0    | 7    | 14      | 64.5  | 7       | 14   | 46.0             | 7    | 7.5  | 6    | 6       | 68.5 | 204                 | 216 | 7       | 6    | 61.0      | 5    | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 25                  | 29 | 19 | 13 | 7             | 7    | 7       | 7    | 77.8  | 49.0                | 49.0    | 7    | 14      | 63.5  | 7       | 14   | 45.5             | 7    | 7.5  | 6    | 6       | 68.6 | 205                 | 217 | 8       | 7.5  | 67.0      | 5    | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 26                  | 30 | 20 | 13 | 7             | 7    | 7       | 7    | 78.3  | 50.0                | 50.0    | 7    | 13      | 63.0  | 7       | 13   | 44.5             | 7    | 6.5  | 6    | 6       | 68.9 | 206                 | 218 | 8       | 7.5  | 67.0      | 5    | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 27                  | 32 | 21 | 13 | 7             | 6.5  | 7       | 7    | 78.9  | 51.0                | 51.0    | 7    | 13      | 62.0  | 7       | 13   | 43.5             | 7    | 7    | 6    | 6       | 69.4 | 208                 | 220 | 8       | 7    | 67.0      | 5    | 12                           | 6    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 28                  | 33 | 22 | 13 | 7             | 6.5  | 7       | 7    | 79.4  | 52.0                | 58.0    | 7    | 12      | 61.0  | 7       | 12   | 43.0             | 7    | 7    | 7    | 7.5     | 72.6 | 209                 | 221 | 8       | 6.5  | 67.0      | 5    | 12                           | 6    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 29                  | 34 | 22 | 13 | 7             | 6.5  | 7       | 6.5  | 79.5  | 59.0                | 59.0    | 7    | 12      | 60.0  | 7       | 12   | 42.0             | 7    | 7    | 7    | 7.5     | 72.9 | 210                 | 222 | 8       | 6.5  | 67.0      | 5    | 12                           | 6    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 30                  | 35 | 23 | 13 | 7             | 6    | 7       | 6.5  | 80.1  | 60.0                | 60.0    | 7    | 12      | 60.0  | 7       | 12   | 41.0             | 7    | 7    | 7    | 7.5     | 73.1 | 211                 | 223 | 8       | 6.5  | 67.0      | 5    | 12                           | 7    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 31                  | 36 | 24 | 13 | 7             | 6    | 7       | 6.5  | 80.8  | 55.0                | 61.0    | 8    | 15      | 67.5  | 8       | 15   | 48.5             | 7    | 6.5  | 7    | 7       | 73.5 | 212                 | 224 | 8       | 6    | 67.0      | 5    | 12                           | 7    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 32                  | 37 | 24 | 13 | 7             | 6    | 7       | 6    | 80.8  | 56.0                | 62.0    | 8    | 15      | 67.0  | 8       | 15   | 48.0             | 7    | 6.5  | 7    | 7       | 73.6 | 213                 | 225 | 8       | 6    | 67.0      | 5    | 12                           | 7    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 32                  | 38 | 26 | 13 | 8             | 7.5  | 7       | 6    | 81.9  | 56.0                | 62.0    | 8    | 14      | 67.0  | 8       | 14   | 48.0             | 7    | 6.5  | 7    | 7.5     | 74.1 | 214                 | 226 | 8       | 6    | 67.0      | 5    | 12                           | 7    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 33                  | 39 | 27 | 13 | 8             | 7    | 7       | 6    | 82.6  | 57.0                | 63.0    | 8    | 15      | 66.0  | 8       | 15   | 47.5             | 7    | 6.5  | 7    | 7.5     | 74.5 | 215                 | 227 | 8       | 6    | 67.0      | 5    | 12                           | 7    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 14 FT |                     |    |    |    |               |      |         |      |      |       |       |       |         |      |       |         |                  |      |         |      |         |      |      |       |       |       |         |      |           |         |      |         | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|-------|---------|------------------|------|---------|------|---------|------|------|-------|-------|-------|---------|------|-----------|---------|------|---------|------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |       |         |      | WALL BARS |         |      |         |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |       | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |       | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE    | SPA.                               | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=7' | HT=8' | HT=9' |         |      |       |         |                  |      |         |      |         |      |      | HT=7' | HT=8' | HT=9' |         |      |           |         |      |         |                                    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 11 | 8  | 8  | 6             | 8    | 5       | 8    | 69.3 | 31.0  | 35.0  | 35.0  | 6       | 16   | 137.5 | 6       | 16               | 46.5 | 5       | 6.5  | 5       | 6    | 57.8 | 91    | 103   | 115   | 6       | 6    | 63.0      | 5       | 12   | 5       | 12                                 | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15                  | 12 | 8  | 8  | 6             | 8    | 5       | 8    | 69.3 | 35.0  | 35.0  | 35.0  | 6       | 16   | 137.5 | 6       | 16               | 48.0 | 5       | 6    | 5       | 6.5  | 52.5 | 92    | 104   | 116   | 6       | 6    | 62.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15                  | 12 | 8  | 8  | 6             | 7.5  | 5       | 6    | 69.3 | 35.0  | 35.0  | 35.0  | 6       | 12   | 137.5 | 6       | 12               | 48.0 | 5       | 6    | 6       | 7    | 52.5 | 92    | 104   | 116   | 7       | 6    | 64.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 12                  | 11 | 8  | 8  | 6             | 7.5  | 5       | 6    | 48.0 | 32.0  | 32.0  | 32.0  | 6       | 12   | 86.0  | 6       | 12               | 39.5 | 5       | 6.5  | 6       | 7    | 49.3 | 91    | 103   | 115   | 7       | 6    | 64.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12                  | 13 | 8  | 8  | 6             | 8    | 6       | 7.5  | 47.6 | 32.0  | 32.0  | 32.0  | 7       | 15   | 74.0  | 7       | 15               | 41.0 | 5       | 6    | 5       | 7    | 41.9 | 93    | 105   | 117   | 7       | 6.5  | 64.5      | 5       | 12   | 5       | 12                                 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 13                  | 14 | 8  | 8  | 5             | 6    | 5       | 6.5  | 41.1 | 33.0  | 33.0  | 33.0  | 7       | 15   | 68.5  | 7       | 15               | 40.0 | 6       | 8    | 5       | 7.5  | 39.1 | 94    | 106   | 118   | 7       | 6.5  | 64.0      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 14                  | 15 | 8  | 8  | 6             | 8    | 5       | 6.5  | 38.6 | 34.0  | 34.0  | 34.0  | 7       | 14   | 66.5  | 7       | 14               | 39.5 | 6       | 7.5  | 5       | 7.5  | 37.4 | 95    | 107   | 119   | 7       | 6    | 63.5      | 5       | 12   | 5       | 12                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 16                  | 17 | 8  | 8  | 6             | 8    | 5       | 6.5  | 41.5 | 36.0  | 36.0  | 36.0  | 7       | 14   | 73.0  | 7       | 14               | 47.5 | 6       | 7    | 5       | 7    | 36.1 | 97    | 109   | 121   | 7       | 6.5  | 63.5      | 5       | 12   | 5       | 11                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 17                  | 18 | 8  | 8  | 6             | 7.5  | 5       | 6    | 40.3 | 37.0  | 37.0  | 37.0  | 7       | 14   | 72.5  | 7       | 14               | 47.0 | 6       | 6.5  | 5       | 6.5  | 35.1 | 98    | 110   | 122   | 7       | 6.5  | 63.0      | 5       | 12   | 5       | 10                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 18                  | 20 | 8  | 8  | 6             | 7    | 6       | 8    | 43.4 | 38.0  | 38.0  | 38.0  | 7       | 13   | 71.5  | 7       | 13               | 47.0 | 6       | 6    | 5       | 6    | 34.4 | 100   | 112   | 124   | 7       | 6.5  | 63.0      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 20                  | 21 | 8  | 8  | 6             | 6.5  | 6       | 7.5  | 42.4 | 44.0  | 44.0  | 44.0  | 7       | 13   | 71.0  | 7       | 13               | 46.5 | 6       | 6    | 6       | 7.5  | 37.0 | 101   | 113   | 125   | 7       | 6.5  | 63.0      | 5       | 12   | 5       | 9.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 21                  | 22 | 8  | 8  | 6             | 6    | 6       | 7    | 41.8 | 45.0  | 45.0  | 45.0  | 7       | 13   | 70.5  | 7       | 13               | 46.5 | 7       | 7.5  | 6       | 7    | 36.5 | 102   | 114   | 126   | 7       | 6    | 63.0      | 5       | 12   | 5       | 9                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 23                  | 24 | 8  | 8  | 7             | 7.5  | 6       | 6    | 41.3 | 47.0  | 47.0  | 47.0  | 7       | 13   | 69.5  | 7       | 13               | 46.5 | 7       | 7.5  | 6       | 6    | 36.4 | 104   | 116   | 128   | 7       | 6    | 63.0      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 24                  | 26 | 9  | 8  | 7             | 7.5  | 6       | 7    | 42.1 | 48.0  | 48.0  | 48.0  | 7       | 13   | 69.0  | 7       | 13               | 46.0 | 7       | 7.5  | 6       | 6.5  | 36.8 | 106   | 118   | 130   | 7       | 6.5  | 63.0      | 5       | 12   | 5       | 8.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 25                  | 27 | 9  | 8  | 7             | 7    | 6       | 6.5  | 41.9 | 49.0  | 49.0  | 49.0  | 7       | 12   | 68.5  | 7       | 12               | 46.0 | 7       | 7.5  | 6       | 6.5  | 36.6 | 107   | 119   | 131   | 7       | 6    | 63.0      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 26                  | 28 | 9  | 8  | 7             | 7    | 6       | 6    | 41.8 | 50.0  | 50.0  | 50.0  | 7       | 12   | 68.0  | 7       | 12               | 46.0 | 7       | 7.5  | 6       | 6    | 36.6 | 108   | 120   | 132   | 7       | 6    | 63.0      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 27                  | 29 | 9  | 8  | 7             | 6.5  | 6       | 6    | 41.1 | 51.0  | 51.0  | 51.0  | 7       | 12   | 67.0  | 7       | 12               | 45.5 | 7       | 7    | 6       | 6    | 35.4 | 109   | 121   | 133   | 8       | 7.5  | 68.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 28                  | 31 | 10 | 8  | 7             | 6.5  | 6       | 6.5  | 41.8 | 52.0  | 52.0  | 52.0  | 7       | 12   | 66.0  | 7       | 12               | 45.0 | 7       | 7    | 6       | 6    | 35.9 | 111   | 123   | 135   | 8       | 7    | 68.5      | 5       | 12   | 5       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 29                  | 32 | 10 | 8  | 7             | 6    | 6       | 6.5  | 41.8 | 53.0  | 53.0  | 53.0  | 7       | 12   | 65.5  | 7       | 12               | 44.5 | 7       | 7    | 6       | 6    | 36.0 | 112   | 124   | 136   | 8       | 7    | 68.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 31                  | 33 | 10 | 8  | 7             | 6    | 6       | 6    | 41.8 | 55.0  | 55.0  | 55.0  | 8       | 15   | 71.5  | 8       | 15               | 50.5 | 7       | 7    | 7       | 6.5  | 39.4 | 113   | 125   | 137   | 8       | 6.5  | 68.5      | 5       | 12   | 5       | 6.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 31                  | 34 | 11 | 8  | 8             | 7    | 6       | 6.5  | 42.3 | 55.0  | 55.0  | 55.0  | 8       | 14   | 71.5  | 8       | 14               | 51.0 | 7       | 6.5  | 6       | 6    | 36.8 | 114   | 126   | 138   | 8       | 6.5  | 68.5      | 5       | 12   | 5       | 7.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 33                  | 35 | 11 | 8  | 8             | 7.5  | 6       | 6    | 42.3 | 57.0  | 57.0  | 57.0  | 8       | 14   | 69.5  | 8       | 14               | 49.0 | 7       | 6    | 6       | 6    | 37.0 | 115   | 127   | 139   | 8       | 6.5  | 68.5      | 5       | 12   | 5       | 7                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 33                  | 37 | 11 | 8  | 8             | 7    | 6       | 6    | 42.3 | 57.0  | 57.0  | 57.0  | 8       | 14   | 69.5  | 8       | 14               | 49.5 | 7       | 6.5  | 7       | 6.5  | 40.1 | 117   | 129   | 141   | 8       | 6    | 68.5      | 5       | 12   | 5       | 6.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 34                  | 38 | 12 | 8  | 8             | 7    | 6       | 6.5  | 43.3 | 58.0  | 58.0  | 58.0  | 8       | 14   | 69.0  | 8       | 14               | 48.5 | 7       | 6.5  | 6       | 6    | 37.6 | 118   | 130   | 142   | 8       | 6    | 68.5      | 5       | 12   | 5       | 7                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 35                  | 39 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 43.1 | 59.0  | 59.0  | 59.0  | 8       | 13   | 68.5  | 8       | 13               | 47.5 | 7       | 6.5  | 6       | 6    | 37.9 | 119   | 131   | 143   | 8       | 6    | 68.5      | 5       | 12   | 5       | 6.5                                | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 36                  | 40 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 43.1 | 60.0  | 60.0  | 60.0  | 8       | 13   | 67.5  | 8       | 13               | 46.5 | 7       | 6.5  | 6       | 6    | 38.1 | 120   | 132   | 144   | 9       | 7    | 74.5      | 5       | 11.5 | 5       | 6                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 37                  | 41 | 12 | 8  | 8             | 6.5  | 6       | 6    | 43.3 | 61.0  | 61.0  | 61.0  | 8       | 13   | 67.0  | 8       | 13               | 46.5 | 7       | 6    | 7       | 6.5  | 41.3 | 121   | 133   | 145   | 9       | 7    | 74.5      | 5       | 8.5  | 6       | 8                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 14 FT |                     |      |      |      |               |        |         |        |      |      |         |      |         |    |       |         |                  |         |        |        |      |         |      |         |      |         |   | HEIGHT (HT) = 10 FT OR 11 FT OR 12 FT |           |   |    |   |     |    |  |  |  |  |  |  |  |
|------------------|---------------------|------|------|------|---------------|--------|---------|--------|------|------|---------|------|---------|----|-------|---------|------------------|---------|--------|--------|------|---------|------|---------|------|---------|---|---------------------------------------|-----------|---|----|---|-----|----|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |        |         |        |      |      |         |      |         |    |       |         | BOTTOM SLAB BARS |         |        |        |      |         |      |         |      |         |   |                                       | WALL BARS |   |    |   |     |    |  |  |  |  |  |  |  |
|                  |                     |      |      |      | A1 BARS       |        | J3 BARS |        |      |      | H1 BARS |      | H2 BARS |    |       | A2 BARS |                  | J4 BARS |        |        |      | H3 BARS |      | B1 BARS |      | B2 BARS |   |                                       |           |   |    |   |     |    |  |  |  |  |  |  |  |
|                  | SIZE                | SPA. | SIZE | SPA. | C1            | K2     |         |        | SIZE | SPA. | C5      | SIZE | SPA.    | C6 | SIZE  | SPA.    | C4               | K3      |        |        | SIZE | SPA.    | C7   | SIZE    | SPA. | G1      |   |                                       |           |   |    |   |     |    |  |  |  |  |  |  |  |
|                  |                     |      |      |      |               | HT=10' | HT=11'  | HT=12' |      |      |         |      |         |    |       |         |                  | HT=10'  | HT=11' | HT=12' |      |         |      |         |      |         |   |                                       |           |   |    |   |     |    |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 12   | 8    | 10   | 6             | 8      | 5       | 7      | 69.6 | 35.0 | 35.0    | 35.0 | 6       | 16 | 138.5 | 6       | 16               | 47.0    | 5      | 6.5    | 6    | 6       | 83.9 | 128     | 140  | 152     | 6 | 6.5                                   | 63.5      | 5 | 12 | 5 | 9.5 | 12 |  |  |  |  |  |  |  |
| 2 FT             | 15                  | 13   | 8    | 10   | 6             | 8      | 5       | 6.5    | 69.6 | 35.0 | 35.0    | 35.0 | 6       | 16 | 138.5 | 6       | 16               | 48.0    | 5      | 6      | 6    | 6       | 77.4 | 129     | 141  | 153     | 6 | 6.5                                   | 63.0      | 5 | 12 | 5 | 9.5 | 12 |  |  |  |  |  |  |  |
| 2'- 4'           | 15                  | 13   | 10   | 10   | 6             | 8      | 5       | 6      | 70.1 | 35.0 | 35.0    | 35.0 | 6       | 13 | 138.5 | 6       | 13               | 48.0    | 5      | 6      | 6    | 6       | 77.4 | 129     | 141  | 153     | 7 | 6.5                                   | 65.5      | 5 | 10 | 5 | 9.5 | 12 |  |  |  |  |  |  |  |
| 4 FT             | 12                  | 12   | 10   | 10   | 6             | 8      | 5       | 6      | 70.1 | 32.0 | 32.0    | 32.0 | 6       | 13 | 85.5  | 6       | 13               | 40.0    | 5      | 6      | 6    | 7       | 65.5 | 128     | 140  | 152     | 7 | 6.5                                   | 65.5      | 5 | 10 | 5 | 9.5 | 12 |  |  |  |  |  |  |  |
| 6 FT             | 12                  | 13   | 10   | 10   | 6             | 8.5    | 5       | 6      | 58.6 | 32.0 | 32.0    | 32.0 | 6       | 12 | 69.0  | 6       | 12               | 38.0    | 5      | 6      | 6    | 7       | 60.8 | 129     | 141  | 153     | 7 | 6.5                                   | 64.5      | 5 | 12 | 5 | 9.5 | 12 |  |  |  |  |  |  |  |
| 8 FT             | 13                  | 14   | 10   | 10   | 5             | 6      | 6       | 7      | 57.1 | 33.0 | 33.0    | 37.0 | 7       | 15 | 68.0  | 7       | 15               | 40.5    | 6      | 8      | 6    | 7       | 57.4 | 130     | 142  | 154     | 7 | 6.5                                   | 64.0      | 5 | 12 | 5 | 9   | 0  |  |  |  |  |  |  |  |
| 10 FT            | 14                  | 16   | 10   | 10   | 5             | 6      | 6       | 7      | 54.4 | 34.0 | 34.0    | 34.0 | 7       | 15 | 66.5  | 7       | 15               | 40.0    | 6      | 7      | 5    | 6       | 52.0 | 132     | 144  | 156     | 7 | 6.5                                   | 64.0      | 5 | 12 | 5 | 8   | 0  |  |  |  |  |  |  |  |
| 12 FT            | 15                  | 17   | 10   | 10   | 6             | 8      | 6       | 7      | 58.6 | 35.0 | 35.0    | 39.0 | 7       | 14 | 73.0  | 7       | 14               | 48.0    | 6      | 7      | 6    | 7.5     | 53.1 | 133     | 145  | 157     | 7 | 6.5                                   | 63.5      | 5 | 12 | 5 | 8   | 0  |  |  |  |  |  |  |  |
| 14 FT            | 17                  | 18   | 10   | 10   | 6             | 7.5    | 6       | 7      | 57.1 | 37.0 | 37.0    | 41.0 | 7       | 14 | 72.5  | 7       | 14               | 47.5    | 6      | 6.5    | 6    | 6.5     | 52.0 | 134     | 146  | 158     | 7 | 6.5                                   | 63.5      | 5 | 12 | 5 | 8   | 0  |  |  |  |  |  |  |  |
| 16 FT            | 18                  | 20   | 11   | 10   | 6             | 7      | 6       | 7      | 57.0 | 38.0 | 38.0    | 42.0 | 7       | 14 | 71.5  | 7       | 14               | 47.5    | 6      | 6      | 6    | 8       | 51.5 | 136     | 148  | 160     | 7 | 6.5                                   | 63.5      | 5 | 12 | 5 | 7.5 | 0  |  |  |  |  |  |  |  |
| 18 FT            | 19                  | 21   | 12   | 10   | 6             | 6.5    | 6       | 7      | 56.9 | 39.0 | 39.0    | 43.0 | 7       | 13 | 71.0  | 7       | 13               | 47.5    | 6      | 6      | 6    | 8.5     | 51.1 | 137     | 149  | 161     | 7 | 6.5                                   | 63.5      | 5 | 12 | 5 | 7   | 0  |  |  |  |  |  |  |  |
| 20 FT            | 21                  | 23   | 12   | 10   | 6             | 6      | 6       | 7      | 56.1 | 41.0 | 41.0    | 45.0 | 7       | 13 | 70.5  | 7       | 13               | 47.0    | 7      | 8      | 6    | 8       | 50.8 | 139     | 151  | 163     | 7 | 6.5                                   | 63.5      | 5 | 12 | 5 | 7   | 0  |  |  |  |  |  |  |  |
| 22 FT            | 22                  | 24   | 12   | 10   | 6             | 6      | 6       | 6.5    | 55.5 | 42.0 | 42.0    | 46.0 | 7       | 13 | 70.0  | 7       | 13               | 47.0    | 7      | 7.5    | 6    | 7.5     | 50.1 | 140     | 152  | 164     | 7 | 6.5                                   | 63.5      | 5 | 12 | 5 | 7   | 0  |  |  |  |  |  |  |  |
| 24 FT            | 23                  | 26   | 13   | 10   | 7             | 7      | 6       | 6.5    | 55.9 | 43.0 | 43.0    | 47.0 | 7       | 12 | 69.5  | 7       | 12               | 47.0    | 7      | 7.5    | 6    | 8.5     | 50.3 | 142     | 154  | 166     | 7 | 6.5                                   | 63.5      | 5 | 12 | 5 | 6.5 | 0  |  |  |  |  |  |  |  |
| 26 FT            | 25                  | 27   | 13   | 10   | 7             | 7      | 6       | 6.5    | 55.5 | 45.0 | 45.0    | 49.0 | 7       | 13 | 68.5  | 7       | 13               | 46.5    | 7      | 7.5    | 6    | 8       | 50.3 | 143     | 155  | 167     | 7 | 6                                     | 63.5      | 5 | 12 | 5 | 6.5 | 0  |  |  |  |  |  |  |  |
| 28 FT            | 26                  | 29   | 14   | 10   | 7             | 7      | 6       | 6.5    | 56.3 | 46.0 | 50.0    | 50.0 | 7       | 13 | 67.5  | 7       | 13               | 46.5    | 7      | 7.5    | 6    | 8.5     | 50.5 | 145     | 157  | 169     | 8 | 7.5                                   | 69.5      | 5 | 12 | 5 | 6   | 0  |  |  |  |  |  |  |  |
| 30 FT            | 27                  | 30   | 14   | 10   | 7             | 6.5    | 6       | 6.5    | 56.0 | 47.0 | 51.0    | 51.0 | 7       | 13 | 67.0  | 7       | 13               | 46.0    | 7      | 7      | 6    | 8       | 50.5 | 146     | 158  | 170     | 8 | 7.5                                   | 69.5      | 5 | 12 | 5 | 6   | 0  |  |  |  |  |  |  |  |
| 32 FT            | 28                  | 31   | 14   | 10   | 7             | 6.5    | 6       | 6.5    | 54.3 | 52.0 | 52.0    | 52.0 | 7       | 12 | 66.0  | 7       | 12               | 45.5    | 7      | 7      | 6    | 7.5     | 48.9 | 147     | 159  | 171     | 8 | 7                                     | 69.5      | 5 | 12 | 5 | 6   | 0  |  |  |  |  |  |  |  |
| 34 FT            | 29                  | 32   | 14   | 10   | 7             | 6      | 6       | 6      | 54.1 | 53.0 | 53.0    | 53.0 | 7       | 12 | 65.0  | 7       | 12               | 44.5    | 7      | 7      | 6    | 7.5     | 48.9 | 148     | 160  | 172     | 8 | 7                                     | 69.0      | 5 | 12 | 5 | 6   | 0  |  |  |  |  |  |  |  |
| 36 FT            | 30                  | 33   | 15   | 10   | 7             | 6      | 6       | 6.5    | 54.9 | 54.0 | 54.0    | 54.0 | 7       | 12 | 64.0  | 7       | 12               | 44.0    | 7      | 6      | 6    | 7       | 49.4 | 149     | 161  | 173     | 8 | 6.5                                   | 69.5      | 5 | 12 | 6 | 8   | 0  |  |  |  |  |  |  |  |
| 38 FT            | 31                  | 35   | 15   | 10   | 8             | 7.5    | 6       | 6      | 55.0 | 55.0 | 55.0    | 55.0 | 8       | 15 | 71.0  | 8       | 15               | 51.0    | 7      | 6.5    | 6    | 6.5     | 49.6 | 151     | 163  | 175     | 8 | 6.5                                   | 69.0      | 5 | 12 | 6 | 8   | 0  |  |  |  |  |  |  |  |
| 40 FT            | 32                  | 36   | 16   | 10   | 8             | 7.5    | 6       | 6      | 55.8 | 56.0 | 56.0    | 56.0 | 8       | 14 | 70.0  | 8       | 14               | 50.0    | 7      | 6.5    | 6    | 6.5     | 50.0 | 152     | 164  | 176     | 8 | 6                                     | 69.5      | 5 | 12 | 6 | 8   | 0  |  |  |  |  |  |  |  |
| 42 FT            | 33                  | 37   | 16   | 10   | 8             | 7      | 6       | 6      | 55.8 | 57.0 | 57.0    | 57.0 | 8       | 14 | 69.5  | 8       | 14               | 49.5    | 7      | 6.5    | 6    | 6.5     | 50.1 | 153     | 165  | 177     | 8 | 6                                     | 69.0      | 5 | 12 | 6 | 8   | 0  |  |  |  |  |  |  |  |
| 44 FT            | 34                  | 38   | 16   | 10   | 8             | 7      | 6       | 6      | 55.6 | 58.0 | 58.0    | 58.0 | 8       | 14 | 69.0  | 8       | 14               | 48.5    | 7      | 6.5    | 6    | 6       | 50.3 | 154     | 166  | 178     | 8 | 6                                     | 69.0      | 5 | 12 | 6 | 8   | 0  |  |  |  |  |  |  |  |
| 46 FT            | 35                  | 39   | 17   | 10   | 8             | 7      | 6       | 6      | 56.5 | 59.0 | 59.0    | 59.0 | 8       | 13 | 68.5  | 8       | 13               | 47.5    | 7      | 6      | 6    | 6       | 50.8 | 155     | 167  | 179     | 8 | 6                                     | 69.0      | 5 | 12 | 6 | 7.5 | 0  |  |  |  |  |  |  |  |
| 48 FT            | 35                  | 40   | 17   | 10   | 8             | 6      | 7       | 7.5    | 61.5 | 59.0 | 59.0    | 59.0 | 8       | 12 | 68.5  | 8       | 12               | 48.0    | 7      | 6      | 6    | 6       | 50.8 | 156     | 168  | 180     | 9 | 7                                     | 75.0      | 5 | 12 | 6 | 7.5 | 0  |  |  |  |  |  |  |  |
| 50 FT            | 36                  | 41   | 17   | 10   | 8             | 6.5    | 7       | 7      | 61.5 | 60.0 | 60.0    | 66.0 | 8       | 13 | 68.0  | 8       | 13               | 47.5    | 7      | 6      | 7    | 8       | 53.9 | 157     | 169  | 181     | 9 | 7                                     | 75.0      | 5 | 12 | 6 | 7.5 | 0  |  |  |  |  |  |  |  |

| SPAN (S) = 14 FT |                     |    |    |    |               |      |         |      |       |                     |         |      |         |       |         |      |                  |      |      |      |         |      |                     |     |         |      |      |      |           |      | HEIGHT (HT) = 13 FT OR 14 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|-------|---------------------|---------|------|---------|-------|---------|------|------------------|------|------|------|---------|------|---------------------|-----|---------|------|------|------|-----------|------|------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |       |                     |         |      |         |       |         |      | BOTTOM SLAB BARS |      |      |      |         |      |                     |     |         |      |      |      | WALL BARS |      |                              |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |       |                     | H1 BARS |      | H2 BARS |       | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |      | B1 BARS             |     | B2 BARS |      |      |      |           |      |                              |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1    | K2<br>HT=13' HT=14' |         | SIZE | SPA.    | C5    | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4   | K3<br>HT=13' HT=14' |     | SIZE    | SPA. | C7   | SIZE | SPA.      | SIZE | SPA.                         | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 12 | 9  | 11 | 6             | 8    | 5       | 6    | 70.4  | 35.0                | 35.0    | 6    | 16      | 139.0 | 6       | 16   | 47.0             | 5    | 6    | 6    | 6       | 96.1 | 164                 | 176 | 6       | 6    | 64.0 | 5    | 12        | 5    | 8.5                          | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15                  | 13 | 10 | 11 | 6             | 8    | 5       | 6    | 71.0  | 35.0                | 35.0    | 6    | 16      | 139.5 | 6       | 16   | 47.5             | 5    | 6    | 6    | 6.5     | 87.6 | 165                 | 177 | 6       | 6.5  | 63.5 | 5    | 12        | 5    | 8                            | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15                  | 13 | 10 | 11 | 6             | 7.5  | 6       | 7.5  | 100.0 | 36.0                | 36.0    | 6    | 13      | 139.5 | 6       | 13   | 47.5             | 5    | 6    | 6    | 6       | 87.6 | 165                 | 177 | 7       | 6.5  | 65.5 | 5    | 12        | 5    | 8                            | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 12                  | 12 | 10 | 11 | 6             | 7.5  | 6       | 7.5  | 100.0 | 36.0                | 36.0    | 6    | 13      | 94.5  | 6       | 13   | 40.0             | 5    | 6    | 6    | 6       | 77.9 | 164                 | 176 | 7       | 6.5  | 65.5 | 5    | 12        | 5    | 8                            | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12                  | 13 | 10 | 11 | 6             | 8    | 6       | 7    | 74.8  | 36.0                | 36.0    | 6    | 12      | 69.0  | 6       | 12   | 38.5             | 5    | 6    | 6    | 6       | 72.4 | 165                 | 177 | 7       | 6.5  | 65.0 | 5    | 12        | 5    | 8                            | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 13                  | 14 | 11 | 11 | 5             | 6    | 6       | 7    | 68.4  | 37.0                | 37.0    | 7    | 16      | 68.0  | 7       | 16   | 41.0             | 6    | 8    | 6    | 7       | 68.4 | 166                 | 178 | 7       | 6    | 64.0 | 5    | 12        | 5    | 7.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 14                  | 16 | 11 | 11 | 5             | 6    | 6       | 6.5  | 65.4  | 38.0                | 38.0    | 7    | 15      | 66.5  | 7       | 15   | 40.5             | 6    | 7    | 6    | 6.5     | 66.8 | 168                 | 180 | 7       | 6.5  | 64.0 | 5    | 12        | 5    | 7.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 15                  | 17 | 12 | 11 | 6             | 8    | 6       | 6.5  | 69.4  | 39.0                | 39.0    | 7    | 14      | 73.0  | 7       | 14   | 48.0             | 6    | 7    | 6    | 7       | 64.6 | 169                 | 181 | 7       | 6.5  | 64.0 | 5    | 12        | 5    | 7                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 17                  | 18 | 12 | 11 | 6             | 7.5  | 6       | 6.5  | 67.9  | 41.0                | 41.0    | 7    | 15      | 72.0  | 7       | 15   | 48.0             | 6    | 6    | 6    | 6       | 63.0 | 170                 | 182 | 7       | 6    | 63.5 | 5    | 12        | 5    | 7                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 18                  | 20 | 13 | 11 | 6             | 7    | 6       | 6.5  | 66.9  | 42.0                | 42.0    | 7    | 14      | 71.5  | 7       | 14   | 47.5             | 6    | 6    | 6    | 7       | 62.1 | 172                 | 184 | 7       | 6.5  | 63.5 | 5    | 12        | 5    | 6.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 19                  | 21 | 13 | 11 | 6             | 6.5  | 6       | 6    | 65.6  | 43.0                | 43.0    | 7    | 13      | 71.0  | 7       | 13   | 47.5             | 7    | 8    | 6    | 6       | 61.0 | 173                 | 185 | 7       | 6.5  | 63.5 | 5    | 12        | 5    | 6.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 21                  | 23 | 14 | 11 | 6             | 6    | 6       | 6    | 65.4  | 45.0                | 45.0    | 7    | 14      | 70.0  | 7       | 14   | 47.5             | 7    | 8    | 6    | 7       | 60.6 | 175                 | 187 | 7       | 6.5  | 63.5 | 5    | 12        | 5    | 6                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 22                  | 24 | 14 | 11 | 6             | 6    | 7       | 8    | 69.4  | 46.0                | 46.0    | 7    | 13      | 69.5  | 7       | 13   | 47.0             | 7    | 7    | 6    | 6       | 59.8 | 176                 | 188 | 7       | 6.5  | 63.5 | 5    | 12        | 5    | 6                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 23                  | 26 | 15 | 11 | 7             | 7.5  | 7       | 8    | 69.5  | 47.0                | 47.0    | 7    | 13      | 69.0  | 7       | 13   | 47.0             | 7    | 7.5  | 6    | 7       | 59.5 | 178                 | 190 | 7       | 6.5  | 63.5 | 5    | 12        | 6    | 8                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 24                  | 27 | 15 | 11 | 7             | 7    | 7       | 7.5  | 69.0  | 48.0                | 48.0    | 7    | 13      | 68.5  | 7       | 13   | 47.0             | 7    | 7    | 6    | 6.5     | 59.3 | 179                 | 191 | 7       | 6    | 63.5 | 5    | 12        | 6    | 8                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 25                  | 29 | 16 | 11 | 7             | 6.5  | 7       | 7.5  | 69.5  | 49.0                | 49.0    | 7    | 13      | 67.5  | 7       | 13   | 46.5             | 7    | 7    | 6    | 7       | 59.5 | 181                 | 193 | 8       | 7.5  | 69.5 | 5    | 12        | 6    | 8                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 27                  | 30 | 16 | 11 | 7             | 6.5  | 7       | 7    | 69.3  | 51.0                | 51.0    | 7    | 13      | 66.0  | 7       | 13   | 45.5             | 7    | 7    | 6    | 6.5     | 59.5 | 182                 | 194 | 8       | 7.5  | 69.5 | 5    | 12        | 6    | 8                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 28                  | 31 | 16 | 11 | 7             | 6.5  | 7       | 7.5  | 67.1  | 52.0                | 52.0    | 7    | 12      | 65.0  | 7       | 12   | 44.5             | 7    | 7    | 6    | 7       | 57.1 | 183                 | 195 | 8       | 7    | 69.5 | 5    | 12        | 6    | 8                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 29                  | 32 | 17 | 11 | 7             | 6    | 7       | 7.5  | 67.8  | 53.0                | 53.0    | 7    | 12      | 64.0  | 7       | 12   | 44.0             | 7    | 6.5  | 6    | 7       | 57.5 | 184                 | 196 | 8       | 7    | 69.5 | 5    | 12        | 6    | 7.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 30                  | 34 | 17 | 11 | 7             | 6    | 7       | 6.5  | 67.8  | 54.0                | 54.0    | 7    | 12      | 63.0  | 7       | 12   | 43.0             | 7    | 7    | 6    | 7       | 57.6 | 186                 | 198 | 8       | 6.5  | 69.5 | 5    | 12        | 6    | 7.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 31                  | 35 | 18 | 11 | 7             | 6    | 7       | 7    | 68.5  | 55.0                | 55.0    | 8    | 15      | 70.0  | 8       | 15   | 50.5             | 7    | 6.5  | 6    | 6.5     | 58.0 | 187                 | 199 | 8       | 6.5  | 69.5 | 5    | 12        | 6    | 7                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 32                  | 36 | 18 | 11 | 8             | 7.5  | 7       | 6.5  | 68.4  | 56.0                | 56.0    | 8    | 14      | 69.5  | 8       | 14   | 49.5             | 7    | 6.5  | 6    | 6.5     | 58.1 | 188                 | 200 | 8       | 6    | 69.5 | 5    | 12        | 6    | 7                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 33                  | 37 | 19 | 11 | 8             | 7    | 7       | 7    | 69.1  | 57.0                | 57.0    | 8    | 14      | 69.0  | 8       | 14   | 48.5             | 7    | 6.5  | 6    | 6.5     | 58.5 | 189                 | 201 | 8       | 6    | 69.5 | 5    | 12        | 6    | 6.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 33                  | 38 | 20 | 11 | 8             | 7    | 7       | 7    | 69.9  | 57.0                | 57.0    | 8    | 14      | 69.0  | 8       | 14   | 49.0             | 7    | 6    | 6    | 6       | 58.9 | 190                 | 202 | 8       | 6    | 69.5 | 5    | 12        | 6    | 6.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 34                  | 39 | 20 | 11 | 8             | 7    | 7       | 6    | 69.8  | 58.0                | 58.0    | 8    | 14      | 68.5  | 8       | 14   | 48.5             | 7    | 6    | 6    | 6       | 59.0 | 191                 | 203 | 8       | 6    | 69.5 | 5    | 12        | 6    | 6.5                          | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 35                  | 41 | 21 | 11 | 8             | 6.5  | 7       | 6.5  | 70.6  | 65.0                | 65.0    | 8    | 13      | 68.0  | 8       | 13   | 47.5             | 7    | 6    | 7    | 8       | 62.5 | 193                 | 205 | 9       | 7    | 75.5 | 5    | 12        | 6    | 6                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 36                  | 42 | 22 | 11 | 8             | 6.5  | 7       | 6.5  | 71.4  | 66.0                | 66.0    | 8    | 14      | 67.0  | 8       | 14   | 47.5             | 7    | 6    | 7    | 7.5     | 63.0 | 194                 | 206 | 9       | 7    | 75.5 | 5    | 12        | 6    | 6                            | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 14 FT |                     |    |    |    |               |      |         |      |       |                        |         |      |         |       |         |      |                  |      |      |      |         |       |                        |     |         |      |           | HEIGHT (HT) = 15 FT OR 16 FT |      |      |      |    |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|-------|------------------------|---------|------|---------|-------|---------|------|------------------|------|------|------|---------|-------|------------------------|-----|---------|------|-----------|------------------------------|------|------|------|----|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |       |                        |         |      |         |       |         |      | BOTTOM SLAB BARS |      |      |      |         |       |                        |     |         |      | WALL BARS |                              |      |      |      |    |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |       |                        | H1 BARS |      | H2 BARS |       | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       | B1 BARS                |     | B2 BARS |      |           |                              |      |      |      |    |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1    | K2<br>HT=15'<br>HT=16' |         | SIZE | SPA.    | C5    | SIZE    | SPA. | C6               | SIZE | SPA. | SIZE | SPA.    | C4    | K3<br>HT=15'<br>HT=16' |     | SIZE    | SPA. | C7        | SIZE                         | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 13 | 12 | 13 | 6             | 8    | 5       | 6    | 72.6  | 35.0                   | 35.0    | 6    | 16      | 141.0 | 6       | 16   | 46.0             | 5    | 6.5  | 6    | 7.5     | 102.5 | 189                    | 201 | 6       | 6.5  | 64.5      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 2 FT             | 15                  | 13 | 12 | 13 | 6             | 8    | 6       | 8    | 75.6  | 35.0                   | 39.0    | 6    | 16      | 144.0 | 6       | 16   | 47.5             | 5    | 6    | 6    | 7       | 95.8  | 189                    | 201 | 6       | 6    | 63.5      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 2'- 4'           | 15                  | 13 | 12 | 13 | 6             | 8    | 6       | 7.5  | 118.3 | 36.0                   | 39.0    | 6    | 13      | 144.0 | 6       | 13   | 47.5             | 5    | 6    | 6    | 6       | 95.8  | 189                    | 201 | 7       | 6.5  | 65.5      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 4 FT             | 12                  | 12 | 12 | 13 | 6             | 8    | 6       | 7.5  | 118.3 | 36.0                   | 36.0    | 6    | 13      | 86.5  | 6       | 13   | 40.0             | 5    | 6    | 6    | 6       | 86.6  | 188                    | 200 | 7       | 6.5  | 65.5      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 6 FT             | 12                  | 13 | 12 | 13 | 5             | 6    | 6       | 7    | 86.4  | 36.0                   | 36.0    | 6    | 12      | 68.0  | 6       | 12   | 39.0             | 5    | 6    | 6    | 6       | 83.0  | 189                    | 201 | 7       | 6    | 65.0      | 5                            | 12   | 5    | 7    | 12 |  |  |  |  |  |  |  |
| 8 FT             | 13                  | 15 | 13 | 13 | 5             | 6    | 6       | 7    | 78.9  | 37.0                   | 37.0    | 6    | 12      | 64.5  | 6       | 12   | 38.0             | 6    | 7.5  | 6    | 6.5     | 80.3  | 191                    | 203 | 7       | 6.5  | 64.5      | 5                            | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |
| 10 FT            | 14                  | 16 | 13 | 13 | 5             | 6    | 6       | 6.5  | 75.0  | 38.0                   | 38.0    | 7    | 15      | 66.0  | 7       | 15   | 41.0             | 6    | 7    | 6    | 6.5     | 77.3  | 192                    | 204 | 7       | 6.5  | 64.5      | 5                            | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |
| 12 FT            | 15                  | 17 | 14 | 13 | 6             | 8    | 6       | 6.5  | 78.5  | 39.0                   | 39.0    | 7    | 15      | 73.0  | 7       | 15   | 48.5             | 6    | 6.5  | 6    | 6.5     | 74.1  | 193                    | 205 | 7       | 6.5  | 64.0      | 5                            | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |
| 14 FT            | 16                  | 19 | 14 | 13 | 6             | 8    | 6       | 6    | 77.0  | 40.0                   | 40.0    | 7    | 14      | 72.0  | 7       | 14   | 48.5             | 6    | 6    | 6    | 6       | 73.6  | 195                    | 207 | 7       | 6.5  | 64.0      | 5                            | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |
| 16 FT            | 18                  | 20 | 15 | 13 | 6             | 7    | 6       | 6    | 76.5  | 42.0                   | 42.0    | 7    | 14      | 71.5  | 7       | 14   | 48.5             | 6    | 6    | 6    | 6       | 72.1  | 196                    | 208 | 7       | 6.5  | 64.0      | 5                            | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |
| 18 FT            | 19                  | 21 | 15 | 13 | 6             | 6.5  | 7       | 7.5  | 80.5  | 43.0                   | 49.0    | 7    | 14      | 71.0  | 7       | 14   | 48.5             | 7    | 8    | 7    | 7       | 74.1  | 197                    | 209 | 7       | 6.5  | 64.0      | 5                            | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |
| 20 FT            | 20                  | 23 | 16 | 13 | 6             | 6.5  | 7       | 7.5  | 79.9  | 44.0                   | 50.0    | 7    | 13      | 70.5  | 7       | 13   | 48.0             | 7    | 7.5  | 7    | 8       | 73.8  | 199                    | 211 | 7       | 6.5  | 64.0      | 5                            | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |
| 22 FT            | 22                  | 25 | 17 | 13 | 6             | 6    | 7       | 7.5  | 79.8  | 46.0                   | 46.0    | 7    | 14      | 69.5  | 7       | 14   | 48.0             | 7    | 7.5  | 6    | 6       | 70.5  | 201                    | 213 | 7       | 6.5  | 64.0      | 5                            | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |
| 24 FT            | 23                  | 26 | 18 | 13 | 7             | 7.5  | 7       | 7.5  | 79.5  | 47.0                   | 47.0    | 7    | 13      | 69.0  | 7       | 13   | 47.5             | 7    | 7.5  | 6    | 6       | 69.9  | 202                    | 214 | 7       | 6.5  | 64.0      | 5                            | 12   | 6    | 7    | 0  |  |  |  |  |  |  |  |
| 26 FT            | 24                  | 27 | 18 | 13 | 7             | 7.5  | 7       | 7    | 79.1  | 48.0                   | 48.0    | 7    | 13      | 68.5  | 7       | 13   | 47.5             | 7    | 6.5  | 6    | 6       | 69.6  | 203                    | 215 | 7       | 6    | 64.0      | 5                            | 12   | 6    | 7    | 0  |  |  |  |  |  |  |  |
| 28 FT            | 25                  | 29 | 19 | 13 | 7             | 7    | 7       | 7    | 79.5  | 49.0                   | 49.0    | 7    | 13      | 68.0  | 7       | 13   | 47.5             | 7    | 7    | 6    | 6       | 70.0  | 205                    | 217 | 8       | 7.5  | 70.0      | 5                            | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |
| 30 FT            | 26                  | 30 | 20 | 13 | 7             | 6.5  | 7       | 7    | 79.8  | 50.0                   | 50.0    | 7    | 13      | 67.0  | 7       | 13   | 47.0             | 7    | 6.5  | 6    | 6       | 69.9  | 206                    | 218 | 8       | 7.5  | 70.0      | 5                            | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |
| 32 FT            | 27                  | 31 | 20 | 13 | 7             | 6.5  | 7       | 7    | 77.4  | 51.0                   | 51.0    | 7    | 13      | 66.5  | 7       | 13   | 47.0             | 7    | 6.5  | 6    | 6       | 67.5  | 207                    | 219 | 8       | 7    | 70.0      | 5                            | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |
| 34 FT            | 28                  | 32 | 20 | 13 | 7             | 6    | 7       | 7    | 77.4  | 52.0                   | 52.0    | 7    | 12      | 65.5  | 7       | 12   | 46.0             | 7    | 6    | 6    | 6       | 67.6  | 208                    | 220 | 8       | 7    | 70.0      | 5                            | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |
| 36 FT            | 29                  | 34 | 21 | 13 | 7             | 6    | 7       | 7    | 78.0  | 53.0                   | 53.0    | 7    | 12      | 64.5  | 7       | 12   | 45.0             | 7    | 6.5  | 6    | 6       | 68.1  | 210                    | 222 | 8       | 6.5  | 70.0      | 5                            | 12   | 6    | 6    | 0  |  |  |  |  |  |  |  |
| 38 FT            | 30                  | 35 | 22 | 13 | 7             | 6    | 7       | 6.5  | 78.6  | 54.0                   | 60.0    | 7    | 12      | 63.5  | 7       | 12   | 44.5             | 7    | 6.5  | 7    | 7.5     | 71.4  | 211                    | 223 | 8       | 6.5  | 70.0      | 5                            | 12   | 6    | 6    | 0  |  |  |  |  |  |  |  |
| 40 FT            | 31                  | 36 | 22 | 13 | 8             | 7.5  | 7       | 6    | 78.6  | 61.0                   | 61.0    | 8    | 15      | 71.0  | 8       | 15   | 51.5             | 7    | 6.5  | 7    | 7.5     | 71.5  | 212                    | 224 | 8       | 6    | 70.0      | 5                            | 12   | 6    | 6    | 0  |  |  |  |  |  |  |  |
| 42 FT            | 32                  | 37 | 23 | 13 | 8             | 7.5  | 7       | 6.5  | 79.3  | 56.0                   | 62.0    | 8    | 14      | 70.0  | 8       | 14   | 51.0             | 7    | 6    | 7    | 7.5     | 71.8  | 213                    | 225 | 8       | 6    | 70.0      | 5                            | 12   | 7    | 7.5  | 0  |  |  |  |  |  |  |  |
| 44 FT            | 33                  | 39 | 24 | 13 | 8             | 7    | 7       | 6.5  | 80.0  | 57.0                   | 63.0    | 8    | 14      | 70.0  | 8       | 14   | 50.0             | 7    | 6    | 7    | 7       | 72.4  | 215                    | 227 | 8       | 6    | 70.0      | 5                            | 12   | 7    | 7.5  | 0  |  |  |  |  |  |  |  |
| 46 FT            | 34                  | 40 | 25 | 13 | 8             | 7    | 7       | 6.5  | 80.6  | 58.0                   | 64.0    | 8    | 14      | 69.5  | 8       | 14   | 49.0             | 7    | 6    | 7    | 7.5     | 72.6  | 216                    | 228 | 9       | 7    | 76.0      | 5                            | 12   | 7    | 7.5  | 0  |  |  |  |  |  |  |  |
| 48 FT            | 35                  | 41 | 26 | 13 | 8             | 7    | 7       | 6    | 81.4  | 65.0                   | 65.0    | 8    | 14      | 68.5  | 8       | 14   | 48.5             | 7    | 6    | 7    | 7.5     | 73.0  | 217                    | 229 | 9       | 7    | 76.5      | 5                            | 12   | 7    | 8    | 0  |  |  |  |  |  |  |  |
| 50 FT            | 35                  | 42 | 27 | 13 | 8             | 6.5  | 7       | 6    | 82.0  | 65.0                   | 65.0    | 8    | 13      | 68.5  | 8       | 13   | 48.5             | 7    | 6    | 7    | 7.5     | 73.3  | 218                    | 230 | 9       | 7    | 76.5      | 5                            | 12   | 7    | 8    | 0  |  |  |  |  |  |  |  |

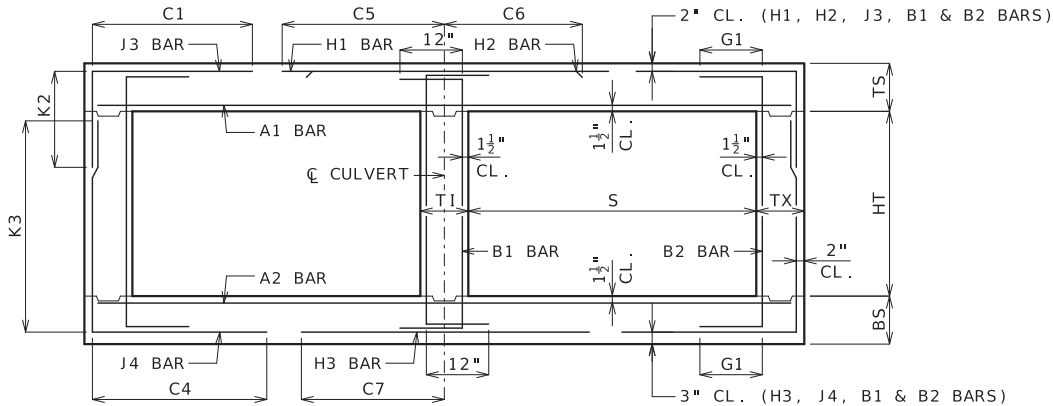


| SPAN (S) = 15 FT |                     |    |    |    |               |      |         |      |      |       |       |        |         |      |       |         |                  |      |         |      |         |      |      |       |       |        |         |      |           |         |      |         | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|-------|--------|---------|------|-------|---------|------------------|------|---------|------|---------|------|------|-------|-------|--------|---------|------|-----------|---------|------|---------|-------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |        |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |        |         |      | WALL BARS |         |      |         |                                     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |        | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |        | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |        | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |        | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE    | SPA.                                | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=8' | HT=9' | HT=10' |         |      |       |         |                  |      |         |      |         |      |      | HT=8' | HT=9' | HT=10' |         |      |           |         |      |         |                                     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 12 | 8  | 8  | 6             | 8    | 5       | 8    | 72.9 | 35.0  | 35.0  | 35.0   | 6       | 16   | 146.0 | 6       | 16               | 51.0 | 5       | 6    | 5       | 6    | 64.9 | 104   | 116   | 128    | 6       | 6    | 66.5      | 5       | 12   | 5       | 12                                  | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 17                  | 13 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 72.9 | 37.0  | 37.0  | 37.0   | 6       | 14   | 146.0 | 6       | 14               | 45.5 | 5       | 6    | 5       | 6    | 57.8 | 105   | 117   | 129    | 6       | 6    | 65.5      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 17                  | 13 | 8  | 8  | 6             | 7    | 5       | 6    | 72.9 | 37.0  | 37.0  | 37.0   | 6       | 12   | 146.0 | 6       | 12               | 45.5 | 5       | 6    | 6       | 6.5  | 57.8 | 105   | 117   | 129    | 7       | 6    | 68.0      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 13                  | 12 | 8  | 8  | 6             | 7    | 5       | 6    | 53.1 | 33.0  | 33.0  | 33.0   | 6       | 12   | 92.5  | 6       | 12               | 41.5 | 5       | 6    | 6       | 6.5  | 53.3 | 104   | 116   | 128    | 7       | 6    | 68.0      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 13                  | 13 | 8  | 8  | 6             | 7.5  | 6       | 7.5  | 50.4 | 33.0  | 33.0  | 37.0   | 7       | 15   | 78.5  | 7       | 15               | 42.5 | 5       | 6    | 6       | 7    | 48.9 | 105   | 117   | 129    | 7       | 6    | 67.0      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 14                  | 15 | 8  | 8  | 6             | 8    | 5       | 6    | 44.0 | 34.0  | 34.0  | 34.0   | 7       | 14   | 72.5  | 7       | 14               | 41.5 | 6       | 7.5  | 5       | 6.5  | 42.8 | 107   | 119   | 131    | 7       | 6    | 67.0      | 5       | 12   | 5       | 11                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 15                  | 16 | 8  | 8  | 6             | 7.5  | 6       | 8    | 50.5 | 35.0  | 35.0  | 35.0   | 7       | 13   | 78.0  | 7       | 13               | 49.0 | 6       | 7    | 5       | 6.5  | 40.9 | 108   | 120   | 132    | 7       | 6    | 66.5      | 5       | 12   | 5       | 10                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 17                  | 18 | 8  | 8  | 6             | 7.5  | 6       | 8    | 48.4 | 37.0  | 37.0  | 37.0   | 7       | 13   | 76.5  | 7       | 13               | 48.5 | 6       | 6.5  | 5       | 6    | 39.6 | 110   | 122   | 134    | 7       | 6    | 66.5      | 5       | 12   | 5       | 9.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 18                  | 19 | 8  | 8  | 6             | 7    | 6       | 7.5  | 47.0 | 38.0  | 38.0  | 42.0   | 7       | 13   | 75.5  | 7       | 13               | 48.5 | 6       | 6    | 6       | 8    | 41.5 | 111   | 123   | 135    | 7       | 6    | 66.5      | 5       | 12   | 5       | 9.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 19                  | 21 | 8  | 8  | 6             | 6    | 6       | 6.5  | 46.1 | 39.0  | 43.0  | 43.0   | 7       | 12   | 75.0  | 7       | 12               | 48.0 | 6       | 6    | 6       | 7    | 40.8 | 113   | 125   | 137    | 7       | 6    | 66.5      | 5       | 12   | 5       | 9                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 21                  | 22 | 9  | 8  | 6             | 6    | 6       | 7.5  | 46.0 | 41.0  | 41.0  | 41.0   | 7       | 12   | 74.0  | 7       | 12               | 48.0 | 7       | 7.5  | 5       | 6    | 37.8 | 114   | 126   | 138    | 7       | 6    | 66.0      | 5       | 12   | 5       | 8.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 22                  | 24 | 9  | 8  | 6             | 6    | 6       | 6.5  | 45.5 | 42.0  | 42.0  | 46.0   | 7       | 12   | 73.5  | 7       | 12               | 47.5 | 7       | 7.5  | 6       | 7    | 40.3 | 116   | 128   | 140    | 7       | 6    | 66.0      | 5       | 12   | 5       | 8.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 24                  | 26 | 10 | 8  | 7             | 7.5  | 6       | 7.5  | 46.0 | 44.0  | 44.0  | 44.0   | 7       | 12   | 72.5  | 7       | 12               | 47.5 | 7       | 7.5  | 5       | 6    | 37.5 | 118   | 130   | 142    | 7       | 6    | 66.0      | 5       | 12   | 5       | 8                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 25                  | 27 | 11 | 8  | 7             | 7    | 6       | 8    | 46.5 | 45.0  | 45.0  | 45.0   | 7       | 12   | 71.5  | 7       | 12               | 47.0 | 7       | 6.5  | 5       | 6    | 37.5 | 119   | 131   | 143    | 8       | 7    | 72.0      | 5       | 12   | 5       | 7.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 27                  | 29 | 11 | 8  | 7             | 6.5  | 6       | 8    | 46.1 | 47.0  | 47.0  | 51.0   | 7       | 12   | 70.5  | 7       | 12               | 47.0 | 7       | 7    | 6       | 7.5  | 40.6 | 121   | 133   | 145    | 8       | 7    | 72.0      | 5       | 12   | 5       | 7.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 28                  | 30 | 11 | 8  | 7             | 6.5  | 6       | 7    | 45.9 | 52.0  | 52.0  | 52.0   | 7       | 12   | 69.5  | 7       | 12               | 46.5 | 7       | 6.5  | 6       | 7    | 40.5 | 122   | 134   | 146    | 8       | 7    | 72.0      | 5       | 12   | 5       | 7.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 29                  | 32 | 12 | 8  | 7             | 6    | 6       | 7.5  | 46.9 | 53.0  | 53.0  | 53.0   | 7       | 12   | 69.0  | 7       | 12               | 46.5 | 7       | 7    | 6       | 7.5  | 41.0 | 124   | 136   | 148    | 8       | 7    | 72.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 30                  | 33 | 12 | 8  | 7             | 6    | 6       | 7.5  | 45.4 | 54.0  | 54.0  | 54.0   | 7       | 12   | 67.5  | 7       | 12               | 46.0 | 7       | 6.5  | 6       | 7    | 39.5 | 125   | 137   | 149    | 8       | 6.5  | 72.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 31                  | 34 | 12 | 8  | 8             | 7.5  | 6       | 7.5  | 45.3 | 55.0  | 55.0  | 55.0   | 8       | 15   | 75.0  | 8       | 15               | 53.0 | 7       | 6.5  | 6       | 7    | 39.6 | 126   | 138   | 150    | 8       | 6.5  | 72.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 32                  | 36 | 12 | 8  | 8             | 7    | 6       | 7    | 45.4 | 56.0  | 56.0  | 56.0   | 8       | 14   | 73.5  | 8       | 14               | 52.5 | 7       | 6.5  | 6       | 6.5  | 39.9 | 128   | 140   | 152    | 8       | 6    | 72.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 33                  | 37 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 45.4 | 57.0  | 57.0  | 57.0   | 8       | 13   | 72.5  | 8       | 13               | 51.5 | 7       | 6.5  | 6       | 6.5  | 40.0 | 129   | 141   | 153    | 8       | 6    | 72.0      | 5       | 12   | 5       | 6.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 35                  | 38 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 45.1 | 59.0  | 59.0  | 59.0   | 8       | 13   | 71.0  | 8       | 13               | 49.5 | 7       | 6    | 6       | 6    | 40.3 | 130   | 142   | 154    | 8       | 6    | 71.5      | 5       | 12   | 5       | 6                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 35                  | 39 | 13 | 8  | 8             | 6    | 6       | 6.5  | 46.1 | 59.0  | 59.0  | 59.0   | 8       | 12   | 71.0  | 8       | 12               | 50.0 | 7       | 6    | 6       | 6    | 40.6 | 131   | 143   | 155    | 8       | 6    | 72.0      | 5       | 12   | 5       | 6.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 36                  | 41 | 13 | 8  | 8             | 6    | 6       | 6.5  | 46.3 | 60.0  | 60.0  | 60.0   | 8       | 12   | 70.5  | 8       | 12               | 49.0 | 7       | 6    | 7       | 7    | 43.9 | 133   | 145   | 157    | 9       | 7    | 77.5      | 5       | 9    | 5       | 6                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 37                  | 42 | 13 | 8  | 8             | 6    | 6       | 6    | 46.3 | 61.0  | 61.0  | 61.0   | 8       | 12   | 70.0  | 8       | 12               | 48.0 | 7       | 6    | 7       | 7    | 44.1 | 134   | 146   | 158    | 9       | 7    | 77.5      | 5       | 6.5  | 6       | 8.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 38                  | 43 | 13 | 9  | 8             | 6    | 6       | 6    | 46.3 | 62.0  | 62.0  | 62.0   | 8       | 12   | 70.5  | 8       | 12               | 48.5 | 7       | 6    | 7       | 6.5  | 44.3 | 135   | 147   | 159    | 9       | 7    | 77.5      | 5       | 12   | 6       | 8                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 39                  | 44 | 14 | 9  | 8             | 6    | 6       | 6    | 47.1 | 63.0  | 63.0  | 63.0   | 8       | 12   | 70.0  | 8       | 12               | 47.5 | 8       | 7.5  | 7       | 7    | 44.8 | 136   | 148   | 160    | 9       | 6.5  | 77.5      | 5       | 12   | 6       | 8                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 15 FT |                     |      |      |      |               |     |         |        |        |        |      |      |         |    |         |      |                  |      |         |     |        |        |        |      |         |      |         |      |           |    |    | HEIGHT (HT) = 11 FT OR 12 FT OR 13 FT |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|------|------|------|---------------|-----|---------|--------|--------|--------|------|------|---------|----|---------|------|------------------|------|---------|-----|--------|--------|--------|------|---------|------|---------|------|-----------|----|----|---------------------------------------|-----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |     |         |        |        |        |      |      |         |    |         |      | BOTTOM SLAB BARS |      |         |     |        |        |        |      |         |      |         |      | WALL BARS |    |    |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |      |      |      | A1 BARS       |     | J3 BARS |        |        |        |      |      | H1 BARS |    | H2 BARS |      | A2 BARS          |      | J4 BARS |     |        |        |        |      | H3 BARS |      | B1 BARS |      | B2 BARS   |    |    |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | SIZE                | SPA. | SIZE | SPA. | C1            | K2  |         |        | SIZE   | SPA.   | C5   | SIZE | SPA.    | C6 | SIZE    | SPA. | SIZE             | SPA. | C4      | K3  |        |        | SIZE   | SPA. | C7      | SIZE | SPA.    | SIZE | SPA.      | G1 |    |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS   | TX   | T1   |               |     |         | HT=11' | HT=12' | HT=13' |      |      |         |    |         |      |                  |      |         |     | HT=11' | HT=12' | HT=13' |      |         |      |         |      |           |    |    |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 12   | 9    | 10   | 6             | 8   | 5       | 6.5    | 73.9   | 35.0   | 35.0 | 35.0 | 6       | 16 | 147.0   | 6    | 16               | 51.0 | 5       | 6   | 6      | 6      | 88.3   | 140  | 152     | 164  | 6       | 6    | 67.0      | 5  | 12 | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 17                  | 13   | 9    | 10   | 6             | 7.5 | 5       | 6.5    | 73.9   | 37.0   | 37.0 | 37.0 | 6       | 14 | 147.0   | 6    | 14               | 46.0 | 5       | 6   | 6      | 6      | 80.4   | 141  | 153     | 165  | 6       | 6    | 66.0      | 5  | 12 | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 17                  | 13   | 9    | 10   | 6             | 7   | 6       | 6      | 85.5   | 37.0   | 37.0 | 37.0 | 6       | 12 | 147.0   | 6    | 12               | 46.0 | 5       | 6   | 6      | 6      | 80.4   | 141  | 153     | 165  | 7       | 6    | 68.5      | 5  | 12 | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 13                  | 12   | 9    | 10   | 6             | 7   | 6       | 6      | 85.5   | 33.0   | 37.0 | 37.0 | 6       | 12 | 96.0    | 6    | 12               | 42.0 | 5       | 6   | 6      | 6      | 70.6   | 140  | 152     | 164  | 7       | 6    | 68.5      | 5  | 12 | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 13                  | 14   | 10   | 10   | 6             | 8   | 6       | 7      | 67.4   | 33.0   | 33.0 | 37.0 | 7       | 15 | 76.5    | 7    | 15               | 43.0 | 6       | 8   | 6      | 6.5    | 66.0   | 142  | 154     | 166  | 7       | 6.5  | 68.0      | 5  | 12 | 5                                     | 8   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 14                  | 15   | 10   | 10   | 6             | 8   | 6       | 6.5    | 62.0   | 34.0   | 34.0 | 38.0 | 7       | 14 | 72.0    | 7    | 14               | 42.0 | 6       | 7.5 | 6      | 6.5    | 62.1   | 143  | 155     | 167  | 7       | 6    | 67.0      | 5  | 12 | 5                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 15                  | 17   | 10   | 10   | 6             | 8   | 6       | 6.5    | 64.6   | 35.0   | 35.0 | 39.0 | 7       | 14 | 78.0    | 7    | 14               | 49.5 | 6       | 7   | 6      | 6.5    | 59.6   | 145  | 157     | 169  | 7       | 6.5  | 67.0      | 5  | 12 | 5                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 16                  | 18   | 11   | 10   | 6             | 7.5 | 6       | 6.5    | 62.6   | 36.0   | 36.0 | 40.0 | 7       | 13 | 76.5    | 7    | 13               | 49.0 | 6       | 6.5 | 6      | 7.5    | 57.4   | 146  | 158     | 170  | 7       | 6    | 67.0      | 5  | 12 | 5                                     | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 18                  | 20   | 12   | 10   | 6             | 7   | 6       | 7      | 62.0   | 38.0   | 38.0 | 42.0 | 7       | 13 | 75.5    | 7    | 13               | 49.0 | 6       | 6   | 6      | 8      | 56.4   | 148  | 160     | 172  | 7       | 6.5  | 67.0      | 5  | 12 | 5                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 19                  | 21   | 12   | 10   | 6             | 6.5 | 6       | 6.5    | 60.9   | 39.0   | 39.0 | 43.0 | 7       | 13 | 74.5    | 7    | 13               | 48.5 | 7       | 8   | 6      | 7.5    | 55.4   | 149  | 161     | 173  | 7       | 6    | 66.5      | 5  | 12 | 5                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 21                  | 22   | 12   | 10   | 6             | 6   | 6       | 6.5    | 59.8   | 41.0   | 45.0 | 45.0 | 7       | 13 | 74.0    | 7    | 13               | 48.5 | 7       | 7   | 6      | 6      | 54.6   | 150  | 162     | 174  | 7       | 6    | 66.5      | 5  | 12 | 5                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 22                  | 24   | 13   | 10   | 6             | 6   | 6       | 6.5    | 59.9   | 42.0   | 42.0 | 46.0 | 7       | 12 | 73.5    | 7    | 12               | 48.5 | 7       | 7   | 6      | 7.5    | 54.4   | 152  | 164     | 176  | 7       | 6    | 66.5      | 5  | 12 | 5                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 23                  | 26   | 13   | 10   | 7             | 7   | 6       | 6      | 59.3   | 43.0   | 43.0 | 47.0 | 7       | 12 | 72.5    | 7    | 12               | 48.0 | 7       | 7   | 6      | 7      | 53.9   | 154  | 166     | 178  | 7       | 6    | 66.5      | 5  | 12 | 5                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 25                  | 28   | 14   | 10   | 7             | 7   | 6       | 6      | 59.5   | 45.0   | 45.0 | 49.0 | 7       | 12 | 71.5    | 7    | 12               | 48.0 | 7       | 7   | 6      | 7.5    | 54.0   | 156  | 168     | 180  | 7       | 6    | 66.5      | 5  | 12 | 5                                     | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 26                  | 29   | 14   | 10   | 7             | 6.5 | 6       | 6      | 59.0   | 50.0   | 50.0 | 50.0 | 7       | 12 | 71.0    | 7    | 12               | 47.5 | 7       | 7   | 6      | 7.5    | 53.6   | 157  | 169     | 181  | 8       | 7    | 72.5      | 5  | 12 | 5                                     | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 27                  | 31   | 15   | 10   | 7             | 6   | 6       | 6      | 59.6   | 51.0   | 51.0 | 51.0 | 7       | 12 | 70.5    | 7    | 12               | 47.5 | 7       | 7   | 6      | 7.5    | 53.9   | 159  | 171     | 183  | 8       | 7    | 72.5      | 5  | 12 | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 29                  | 32   | 15   | 10   | 7             | 6   | 7       | 8      | 64.3   | 53.0   | 53.0 | 53.0 | 7       | 12 | 69.0    | 7    | 12               | 47.0 | 7       | 6.5 | 6      | 7.5    | 54.0   | 160  | 172     | 184  | 8       | 7    | 72.5      | 5  | 12 | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 30                  | 33   | 16   | 10   | 7             | 6   | 6       | 6      | 59.9   | 54.0   | 54.0 | 54.0 | 7       | 12 | 68.0    | 7    | 12               | 46.5 | 7       | 6   | 6      | 7      | 54.3   | 161  | 173     | 185  | 8       | 6.5  | 72.5      | 5  | 12 | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 31                  | 35   | 16   | 10   | 8             | 7.5 | 6       | 6      | 58.3   | 55.0   | 55.0 | 55.0 | 8       | 15 | 75.0    | 8    | 15               | 53.0 | 7       | 6.5 | 6      | 6.5    | 52.6   | 163  | 175     | 187  | 8       | 6.5  | 72.5      | 5  | 12 | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 32                  | 36   | 16   | 10   | 8             | 7.5 | 7       | 7.5    | 63.1   | 56.0   | 56.0 | 56.0 | 8       | 14 | 74.0    | 8    | 14               | 52.5 | 7       | 6.5 | 6      | 6.5    | 52.8   | 164  | 176     | 188  | 8       | 6    | 72.5      | 5  | 12 | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 33                  | 37   | 16   | 10   | 8             | 7   | 7       | 7      | 63.1   | 57.0   | 57.0 | 57.0 | 8       | 14 | 72.5    | 8    | 14               | 52.0 | 7       | 6   | 6      | 6.5    | 52.9   | 165  | 177     | 189  | 8       | 6    | 72.5      | 5  | 12 | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 34                  | 38   | 17   | 10   | 8             | 7   | 7       | 7.5    | 63.9   | 58.0   | 58.0 | 58.0 | 8       | 14 | 72.0    | 8    | 14               | 51.0 | 7       | 6   | 6      | 6      | 53.3   | 166  | 178     | 190  | 8       | 6    | 72.5      | 5  | 12 | 6                                     | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 35                  | 40   | 18   | 10   | 8             | 6.5 | 7       | 7.5    | 64.8   | 59.0   | 59.0 | 59.0 | 8       | 13 | 71.5    | 8    | 13               | 50.0 | 7       | 6   | 6      | 6      | 53.8   | 168  | 180     | 192  | 9       | 7    | 78.5      | 5  | 12 | 6                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 36                  | 41   | 18   | 10   | 8             | 6.5 | 7       | 7.5    | 64.6   | 60.0   | 60.0 | 66.0 | 8       | 13 | 71.0    | 8    | 13               | 49.5 | 7       | 6   | 7      | 8      | 56.9   | 169  | 181     | 193  | 9       | 7    | 78.5      | 5  | 12 | 6                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 37                  | 42   | 18   | 10   | 8             | 6.5 | 7       | 6.5    | 64.6   | 61.0   | 61.0 | 67.0 | 8       | 12 | 70.5    | 8    | 12               | 48.5 | 7       | 6   | 7      | 7.5    | 57.0   | 170  | 182     | 194  | 9       | 7    | 78.5      | 5  | 12 | 6                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 38                  | 43   | 19   | 10   | 8             | 6   | 7       | 7      | 65.4   | 62.0   | 62.0 | 68.0 | 8       | 13 | 69.5    | 8    | 13               | 48.0 | 8       | 7.5 | 7      | 7.5    | 57.5   | 171  | 183     | 195  | 9       | 7    | 78.5      | 5  | 12 | 6                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 39                  | 44   | 19   | 10   | 8             | 6   | 7       | 6.5    | 65.3   | 63.0   | 63.0 | 69.0 | 8       | 13 | 69.0    | 8    | 13               | 47.5 | 8       | 7.5 | 7      | 7      | 57.6   | 172  | 184     | 196  | 9       | 6.5  | 78.5      | 5  | 12 | 6                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 15 FT |                  |    |    |    |               |      |         |      |       |        |        |        |         |      |       |         |                  |      |         |      |         |      |       |        |        |        |         |      |           |         |      |         | HEIGHT (HT) = 14 FT OR 15 FT OR 16 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|-------|--------|--------|--------|---------|------|-------|---------|------------------|------|---------|------|---------|------|-------|--------|--------|--------|---------|------|-----------|---------|------|---------|---------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |       |        |        |        |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |      |       |        |        |        |         |      | WALL BARS |         |      |         |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |       |        |        |        | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |       |        |        |        | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1    | K2     |        |        | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4    | K3     |        |        | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE    | SPA.                                  | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |       | HT=14' | HT=15' | HT=16' |         |      |       |         |                  |      |         |      |         |      |       | HT=14' | HT=15' | HT=16' |         |      |           |         |      |         |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15               | 13 | 12 | 13 | 6             | 8    | 6       | 8.5  | 79.3  | 35.0   | 35.0   | 39.0   | 6       | 16   | 152.5 | 6       | 16               | 50.0 | 5       | 6    | 6       | 7    | 102.4 | 177    | 189    | 201    | 6       | 6    | 67.5      | 5       | 11   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 16               | 14 | 12 | 13 | 6             | 7.5  | 5       | 6    | 76.3  | 36.0   | 36.0   | 36.0   | 6       | 15   | 149.5 | 6       | 15               | 48.5 | 6       | 8    | 6       | 7.5  | 96.3  | 178    | 190    | 202    | 6       | 6    | 67.0      | 5       | 12   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 16               | 14 | 12 | 13 | 6             | 7    | 6       | 7    | 101.4 | 36.0   | 36.0   | 36.0   | 6       | 12   | 149.5 | 6       | 12               | 48.5 | 6       | 8    | 6       | 6.5  | 96.3  | 178    | 190    | 202    | 7       | 6.5  | 69.0      | 5       | 10.5 | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 12               | 13 | 12 | 13 | 6             | 7    | 6       | 7    | 101.4 | 36.0   | 36.0   | 36.0   | 6       | 12   | 86.5  | 6       | 12               | 41.5 | 5       | 6    | 6       | 6.5  | 88.5  | 177    | 189    | 201    | 7       | 6.5  | 69.0      | 5       | 10.5 | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 13               | 14 | 12 | 13 | 6             | 8    | 6       | 6.5  | 86.3  | 37.0   | 37.0   | 37.0   | 7       | 16   | 74.5  | 7       | 16               | 43.5 | 6       | 8    | 6       | 6.5  | 82.9  | 178    | 190    | 202    | 7       | 6    | 68.0      | 5       | 12   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 13               | 15 | 13 | 13 | 6             | 8    | 6       | 6.5  | 76.4  | 37.0   | 37.0   | 37.0   | 7       | 14   | 70.5  | 7       | 14               | 42.5 | 6       | 7.5  | 6       | 6.5  | 77.9  | 179    | 191    | 203    | 7       | 6    | 68.0      | 5       | 12   | 5       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 15               | 17 | 13 | 13 | 6             | 8    | 6       | 6    | 80.6  | 39.0   | 39.0   | 39.0   | 7       | 14   | 77.5  | 7       | 14               | 50.5 | 6       | 7    | 6       | 6.5  | 76.0  | 181    | 193    | 205    | 7       | 6.5  | 67.5      | 5       | 12   | 5       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 16               | 18 | 14 | 13 | 6             | 8    | 6       | 6    | 78.4  | 40.0   | 40.0   | 40.0   | 7       | 14   | 76.5  | 7       | 14               | 50.0 | 6       | 6.5  | 6       | 6.5  | 73.8  | 182    | 194    | 206    | 7       | 6    | 67.5      | 5       | 12   | 5       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 17               | 20 | 14 | 13 | 6             | 7.5  | 7       | 7.5  | 81.6  | 41.0   | 41.0   | 41.0   | 7       | 13   | 75.5  | 7       | 13               | 50.0 | 6       | 6    | 6       | 6    | 72.9  | 184    | 196    | 208    | 7       | 6    | 67.5      | 5       | 12   | 5       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 19               | 21 | 15 | 13 | 6             | 6.5  | 7       | 8    | 80.9  | 43.0   | 43.0   | 49.0   | 7       | 13   | 75.0  | 7       | 13               | 49.5 | 7       | 8    | 7       | 8    | 74.4  | 185    | 197    | 209    | 7       | 6    | 67.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 20               | 23 | 16 | 13 | 6             | 6.5  | 7       | 8    | 80.1  | 44.0   | 44.0   | 44.0   | 7       | 13   | 74.0  | 7       | 13               | 49.5 | 7       | 7.5  | 6       | 6    | 70.8  | 187    | 199    | 211    | 7       | 6    | 67.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 21               | 24 | 17 | 13 | 6             | 6    | 7       | 7.5  | 79.5  | 45.0   | 45.0   | 45.0   | 7       | 12   | 73.5  | 7       | 12               | 49.5 | 7       | 7    | 6       | 6    | 69.8  | 188    | 200    | 212    | 7       | 6    | 67.0      | 5       | 12   | 6       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 23               | 26 | 17 | 13 | 7             | 7.5  | 7       | 7.5  | 78.9  | 47.0   | 47.0   | 47.0   | 7       | 12   | 73.0  | 7       | 12               | 49.0 | 7       | 7    | 6       | 6    | 69.4  | 190    | 202    | 214    | 7       | 6    | 67.0      | 5       | 12   | 6       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 24               | 28 | 18 | 13 | 7             | 7    | 7       | 7.5  | 78.6  | 48.0   | 48.0   | 48.0   | 7       | 12   | 72.5  | 7       | 12               | 49.0 | 7       | 7    | 6       | 6.5  | 69.0  | 192    | 204    | 216    | 7       | 6    | 67.0      | 5       | 12   | 6       | 7                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 26               | 29 | 18 | 13 | 7             | 7    | 7       | 7    | 78.1  | 50.0   | 50.0   | 50.0   | 7       | 12   | 71.5  | 7       | 12               | 49.0 | 7       | 6    | 6       | 6    | 68.5  | 193    | 205    | 217    | 8       | 7    | 73.0      | 5       | 12   | 6       | 7                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 27               | 31 | 19 | 13 | 7             | 6.5  | 7       | 7    | 78.5  | 51.0   | 51.0   | 51.0   | 7       | 12   | 71.0  | 7       | 12               | 48.5 | 7       | 6.5  | 6       | 6    | 68.6  | 195    | 207    | 219    | 8       | 7    | 73.0      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 28               | 32 | 19 | 13 | 7             | 6    | 7       | 6    | 78.1  | 52.0   | 52.0   | 52.0   | 7       | 12   | 70.5  | 7       | 12               | 48.5 | 7       | 6.5  | 6       | 6    | 68.5  | 196    | 208    | 220    | 8       | 7    | 73.0      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 30               | 34 | 20 | 13 | 7             | 6    | 7       | 6.5  | 78.8  | 54.0   | 54.0   | 54.0   | 7       | 12   | 69.0  | 7       | 12               | 47.0 | 7       | 6.5  | 6       | 6    | 68.9  | 198    | 210    | 222    | 8       | 6.5  | 73.0      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 31               | 35 | 20 | 13 | 7             | 6    | 7       | 6.5  | 76.3  | 55.0   | 55.0   | 55.0   | 8       | 15   | 76.0  | 8       | 15               | 54.0 | 7       | 6.5  | 6       | 6    | 66.4  | 199    | 211    | 223    | 8       | 6.5  | 73.0      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 32               | 36 | 21 | 13 | 8             | 7.5  | 7       | 6.5  | 76.8  | 56.0   | 56.0   | 56.0   | 8       | 14   | 75.0  | 8       | 14               | 53.5 | 7       | 6    | 6       | 6    | 66.6  | 200    | 212    | 224    | 8       | 6    | 73.0      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 33               | 37 | 21 | 13 | 8             | 7    | 7       | 6    | 76.8  | 57.0   | 57.0   | 57.0   | 8       | 14   | 74.0  | 8       | 14               | 53.0 | 7       | 6    | 6       | 6    | 66.6  | 201    | 213    | 225    | 8       | 6    | 73.0      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 34               | 39 | 22 | 13 | 8             | 7    | 7       | 6    | 77.5  | 58.0   | 58.0   | 64.0   | 8       | 14   | 73.0  | 8       | 14               | 52.0 | 7       | 6    | 7       | 7.5  | 70.1  | 203    | 215    | 227    | 8       | 6    | 73.0      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 35               | 40 | 23 | 13 | 8             | 7    | 7       | 6.5  | 78.1  | 59.0   | 59.0   | 65.0   | 8       | 13   | 72.5  | 8       | 13               | 51.0 | 7       | 6    | 7       | 7.5  | 70.4  | 204    | 216    | 228    | 9       | 7    | 79.0      | 5       | 12   | 7       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 35               | 41 | 24 | 13 | 8             | 6    | 7       | 6    | 78.9  | 65.0   | 65.0   | 65.0   | 8       | 12   | 72.5  | 8       | 12               | 52.0 | 8       | 7.5  | 7       | 7    | 70.6  | 205    | 217    | 229    | 9       | 7    | 79.5      | 5       | 12   | 7       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 36               | 42 | 25 | 13 | 8             | 6    | 7       | 6    | 79.5  | 66.0   | 66.0   | 66.0   | 8       | 12   | 72.0  | 8       | 12               | 51.0 | 8       | 7    | 7       | 7.5  | 70.9  | 206    | 218    | 230    | 9       | 7    | 79.5      | 5       | 12   | 7       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 37               | 43 | 26 | 13 | 8             | 6.5  | 7       | 6    | 80.3  | 67.0   | 67.0   | 67.0   | 8       | 12   | 71.5  | 8       | 12               | 50.0 | 8       | 6.5  | 7       | 7.5  | 71.3  | 207    | 219    | 231    | 9       | 7    | 79.5      | 5       | 12   | 7       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 38               | 45 | 27 | 13 | 8             | 6    | 7       | 6    | 81.1  | 68.0   | 68.0   | 68.0   | 8       | 12   | 71.0  | 8       | 12               | 49.0 | 8       | 7    | 7       | 7    | 71.8  | 209    | 221    | 233    | 9       | 6.5  | 79.5      | 5       | 12   | 7       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

BRYAN A. HARTNAGEL

NUMBER PE-2002024473

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 15 FEET  
HEIGHT (HT): 14 THRU 16 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.47A

SHEET NO.  
25 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

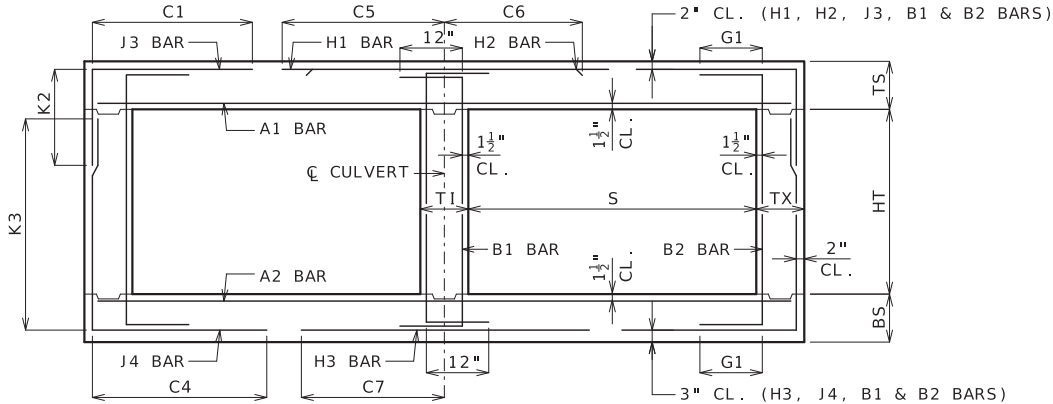
| SPAN (S) = 16 FT |                  |    |    |    |               |      |         |      |      |       |       |        |         |      |       |         |                  |      |         |      |         |      |      |       |       |        |         |      |           |         |      |         | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|--------|---------|------|-------|---------|------------------|------|---------|------|---------|------|------|-------|-------|--------|---------|------|-----------|---------|------|---------|-------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |        |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |      |      |       |       |        |         |      | WALL BARS |         |      |         |                                     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |        | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |      |      |       |       |        | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |        | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | SIZE    | SPA. | C4   | K3    |       |        | SIZE    | SPA. | C7        | SIZE    | SPA. | SIZE    | SPA.                                | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=8' | HT=9' | HT=10' |         |      |       |         |                  |      |         |      |         |      |      | HT=8' | HT=9' | HT=10' |         |      |           |         |      |         |                                     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15               | 12 | 8  | 8  | 6             | 7.5  | 5       | 8    | 76.5 | 35.0  | 35.0  | 35.0   | 6       | 15   | 154.5 | 6       | 15               | 54.0 | 5       | 6    | 6       | 7    | 66.9 | 104   | 116   | 128    | 7       | 7    | 72.5      | 5       | 12   | 5       | 12                                  | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 17               | 13 | 8  | 8  | 6             | 7    | 5       | 6.5  | 76.5 | 37.0  | 37.0  | 37.0   | 6       | 14   | 154.5 | 6       | 14               | 50.0 | 5       | 6    | 5       | 6    | 56.4 | 105   | 117   | 129    | 7       | 7    | 71.5      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 17               | 13 | 8  | 8  | 6             | 6.5  | 6       | 7    | 76.5 | 37.0  | 37.0  | 37.0   | 7       | 14   | 154.5 | 7       | 14               | 50.0 | 5       | 6    | 5       | 6    | 56.4 | 105   | 117   | 129    | 7       | 6    | 71.5      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 13               | 13 | 8  | 8  | 6             | 6.5  | 6       | 7    | 55.6 | 33.0  | 33.0  | 33.0   | 7       | 14   | 97.0  | 7       | 14               | 45.5 | 5       | 6    | 5       | 6    | 49.6 | 105   | 117   | 129    | 7       | 6    | 71.0      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 14               | 14 | 8  | 8  | 6             | 7    | 5       | 6    | 47.1 | 34.0  | 34.0  | 34.0   | 7       | 14   | 82.0  | 7       | 14               | 44.0 | 6       | 8    | 5       | 6    | 45.1 | 106   | 118   | 130    | 7       | 6    | 70.5      | 5       | 12   | 5       | 12                                  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 15               | 16 | 8  | 8  | 6             | 7.5  | 5       | 6    | 48.4 | 35.0  | 35.0  | 35.0   | 7       | 13   | 84.0  | 7       | 13               | 51.0 | 6       | 7    | 5       | 7    | 41.9 | 108   | 120   | 132    | 7       | 6    | 70.0      | 5       | 12   | 5       | 11                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 16               | 17 | 8  | 8  | 6             | 7    | 6       | 8    | 49.6 | 36.0  | 36.0  | 36.0   | 7       | 12   | 81.5  | 7       | 12               | 50.5 | 6       | 7    | 5       | 6.5  | 39.9 | 109   | 121   | 133    | 7       | 6    | 69.5      | 5       | 12   | 5       | 10                                  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 18               | 19 | 8  | 8  | 6             | 7    | 6       | 7.5  | 47.5 | 38.0  | 38.0  | 38.0   | 7       | 12   | 80.0  | 7       | 12               | 50.0 | 6       | 6    | 5       | 6    | 38.6 | 111   | 123   | 135    | 7       | 6    | 69.5      | 5       | 12   | 5       | 9.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 19               | 20 | 8  | 8  | 6             | 6.5  | 6       | 7    | 46.0 | 39.0  | 39.0  | 43.0   | 7       | 12   | 79.0  | 7       | 12               | 49.5 | 6       | 6    | 6       | 7.5  | 40.5 | 112   | 124   | 136    | 7       | 6    | 69.5      | 5       | 12   | 5       | 9.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 21               | 22 | 8  | 8  | 6             | 6    | 6       | 7    | 44.9 | 45.0  | 45.0  | 45.0   | 7       | 12   | 78.0  | 7       | 12               | 49.5 | 7       | 7.5  | 6       | 7    | 39.9 | 114   | 126   | 138    | 7       | 6    | 69.5      | 5       | 12   | 5       | 8.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 22               | 23 | 9  | 8  | 6             | 6    | 6       | 7.5  | 45.1 | 42.0  | 42.0  | 42.0   | 8       | 15   | 85.0  | 8       | 15               | 57.0 | 7       | 6.5  | 5       | 6    | 36.8 | 115   | 127   | 139    | 8       | 6.5  | 75.5      | 5       | 12   | 5       | 8.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 24               | 25 | 9  | 8  | 7             | 7.5  | 6       | 7    | 44.4 | 48.0  | 48.0  | 48.0   | 8       | 15   | 84.0  | 8       | 15               | 57.0 | 7       | 7    | 6       | 7    | 39.4 | 117   | 129   | 141    | 8       | 7    | 75.5      | 5       | 12   | 5       | 8.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 25               | 27 | 10 | 8  | 7             | 7    | 6       | 7.5  | 45.0 | 45.0  | 45.0  | 49.0   | 8       | 14   | 83.5  | 8       | 14               | 56.5 | 7       | 6.5  | 6       | 7    | 39.5 | 119   | 131   | 143    | 8       | 7    | 75.5      | 5       | 12   | 5       | 8                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 27               | 29 | 10 | 8  | 7             | 6.5  | 6       | 6.5  | 44.5 | 51.0  | 51.0  | 51.0   | 8       | 14   | 82.5  | 8       | 14               | 56.5 | 7       | 6.5  | 6       | 6.5  | 39.3 | 121   | 133   | 145    | 8       | 7    | 75.0      | 5       | 12   | 5       | 8                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 28               | 31 | 11 | 8  | 7             | 6    | 6       | 7.5  | 45.3 | 52.0  | 52.0  | 52.0   | 8       | 14   | 81.5  | 8       | 14               | 56.0 | 7       | 6.5  | 6       | 7    | 39.5 | 123   | 135   | 147    | 8       | 7    | 75.0      | 5       | 12   | 5       | 7.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 30               | 32 | 11 | 8  | 7             | 6    | 6       | 7    | 44.9 | 54.0  | 54.0  | 54.0   | 8       | 14   | 80.5  | 8       | 14               | 56.0 | 7       | 6.5  | 6       | 6.5  | 39.6 | 124   | 136   | 148    | 8       | 7    | 75.0      | 5       | 12   | 5       | 7.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 31               | 34 | 11 | 8  | 8             | 7.5  | 6       | 6    | 44.9 | 55.0  | 55.0  | 55.0   | 8       | 14   | 79.5  | 8       | 14               | 55.5 | 7       | 6.5  | 6       | 6    | 39.6 | 126   | 138   | 150    | 8       | 6.5  | 75.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 32               | 35 | 12 | 8  | 8             | 7    | 6       | 7    | 45.8 | 56.0  | 56.0  | 56.0   | 8       | 14   | 78.5  | 8       | 14               | 55.0 | 7       | 6    | 6       | 6.5  | 40.0 | 127   | 139   | 151    | 8       | 6.5  | 75.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 33               | 36 | 12 | 8  | 8             | 7    | 6       | 7    | 45.3 | 57.0  | 57.0  | 57.0   | 8       | 14   | 77.5  | 8       | 14               | 54.5 | 7       | 6    | 6       | 6.5  | 39.3 | 128   | 140   | 152    | 8       | 6    | 75.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 35               | 38 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 45.3 | 59.0  | 59.0  | 59.0   | 8       | 13   | 75.0  | 8       | 13               | 52.0 | 7       | 6    | 6       | 6    | 39.3 | 130   | 142   | 154    | 8       | 6    | 75.0      | 5       | 12   | 5       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 36               | 39 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 45.3 | 60.0  | 60.0  | 60.0   | 8       | 13   | 74.0  | 8       | 13               | 51.5 | 7       | 6    | 6       | 6    | 39.3 | 131   | 143   | 155    | 8       | 6    | 75.0      | 5       | 12   | 5       | 6.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 37               | 41 | 12 | 8  | 8             | 6.5  | 6       | 6    | 45.3 | 61.0  | 61.0  | 61.0   | 8       | 12   | 73.5  | 8       | 12               | 50.5 | 7       | 6    | 7       | 6.5  | 42.5 | 133   | 145   | 157    | 9       | 7    | 80.5      | 5       | 11   | 5       | 6                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 38               | 42 | 12 | 8  | 8             | 6    | 6       | 6    | 45.3 | 62.0  | 62.0  | 62.0   | 8       | 12   | 73.0  | 8       | 12               | 50.0 | 7       | 6    | 7       | 6    | 42.6 | 134   | 146   | 158    | 9       | 7    | 80.5      | 5       | 7    | 6       | 8                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 39               | 43 | 13 | 9  | 8             | 6    | 6       | 6    | 45.8 | 63.0  | 63.0  | 63.0   | 8       | 12   | 73.5  | 8       | 12               | 50.5 | 8       | 7.5  | 7       | 6.5  | 43.1 | 135   | 147   | 159    | 9       | 7    | 81.0      | 5       | 12   | 5       | 6                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 40               | 44 | 13 | 9  | 8             | 6    | 7       | 7    | 50.8 | 70.0  | 70.0  | 70.0   | 8       | 12   | 73.0  | 8       | 12               | 49.5 | 8       | 7.5  | 7       | 6.5  | 43.4 | 136   | 148   | 160    | 9       | 6.5  | 80.5      | 5       | 12   | 6       | 8                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 41               | 45 | 13 | 9  | 9             | 7.5  | 7       | 7    | 50.8 | 71.0  | 71.0  | 71.0   | 9       | 15   | 80.5  | 9       | 15               | 56.5 | 8       | 7    | 7       | 6.5  | 43.5 | 137   | 149   | 161    | 9       | 6.5  | 80.5      | 5       | 12   | 6       | 7.5                                 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 42               | 46 | 13 | 9  | 9             | 7    | 7       | 6.5  | 50.8 | 72.0  | 72.0  | 72.0   | 9       | 14   | 80.0  | 9       | 14               | 56.0 | 8       | 7    | 7       | 6    | 43.8 | 138   | 150   | 162    | 9       | 6.5  | 80.5      | 5       | 9.5  | 6       | 7                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 16 FT |                  |      |      |      |               |     |         |        |        |        |      |      |         |    |         |      |                  |      |         |        |        |      |      |      |         |      |         |     |           |   |      | HEIGHT (HT) = 11 FT OR 12 FT OR 13 FT |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|------|------|------|---------------|-----|---------|--------|--------|--------|------|------|---------|----|---------|------|------------------|------|---------|--------|--------|------|------|------|---------|------|---------|-----|-----------|---|------|---------------------------------------|-----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |     |         |        |        |        |      |      |         |    |         |      | BOTTOM SLAB BARS |      |         |        |        |      |      |      |         |      |         |     | WALL BARS |   |      |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |      |      |      | A1 BARS       |     | J3 BARS |        |        |        |      |      | H1 BARS |    | H2 BARS |      | A2 BARS          |      | J4 BARS |        |        |      |      |      | H3 BARS |      | B1 BARS |     | B2 BARS   |   |      |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | SIZE             | SPA. | SIZE | SPA. | C1            | K2  |         |        | SIZE   | SPA.   | C5   | SIZE | SPA.    | C6 | SIZE    | SPA. | C4               | K3   |         |        | SIZE   | SPA. | C7   | SIZE | SPA.    | SIZE | SPA.    | G1  |           |   |      |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS   | TX   | T1   |               |     |         | HT=11' | HT=12' | HT=13' |      |      |         |    |         |      |                  |      | HT=11'  | HT=12' | HT=13' |      |      |      |         |      |         |     |           |   |      |                                       |     |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15               | 13   | 9    | 10   | 6             | 7.5 | 5       | 6      | 77.5   | 35.0   | 35.0 | 35.0 | 6       | 15 | 155.5   | 6    | 15               | 53.5 | 5       | 6      | 6      | 6    | 89.5 | 141  | 153     | 165  | 6       | 6   | 70.0      | 5 | 11.5 | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 17               | 14   | 9    | 10   | 6             | 7.5 | 5       | 6.5    | 77.5   | 37.0   | 37.0 | 37.0 | 6       | 14 | 155.5   | 6    | 14               | 50.0 | 6       | 8      | 6      | 6.5  | 79.8 | 142  | 154     | 166  | 6       | 6   | 69.5      | 5 | 12   | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 17               | 14   | 10   | 10   | 6             | 6.5 | 6       | 7      | 77.5   | 37.0   | 37.0 | 37.0 | 7       | 15 | 155.5   | 7    | 15               | 50.0 | 6       | 8      | 6      | 6.5  | 79.8 | 142  | 154     | 166  | 7       | 6   | 71.5      | 5 | 11   | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 13               | 13   | 10   | 10   | 6             | 6.5 | 6       | 7      | 76.9   | 33.0   | 37.0 | 37.0 | 7       | 15 | 96.5    | 7    | 15               | 46.0 | 5       | 6      | 6      | 6.5  | 70.0 | 141  | 153     | 165  | 7       | 6   | 71.5      | 5 | 11   | 5                                     | 8.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 13               | 14   | 10   | 10   | 6             | 7   | 6       | 7      | 65.3   | 33.0   | 37.0 | 37.0 | 7       | 13 | 79.5    | 7    | 13               | 44.0 | 6       | 8      | 6      | 6.5  | 64.5 | 142  | 154     | 166  | 7       | 6   | 71.0      | 5 | 12   | 5                                     | 8   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 14               | 16   | 10   | 10   | 6             | 7   | 6       | 6.5    | 60.3   | 34.0   | 34.0 | 38.0 | 7       | 13 | 75.0    | 7    | 13               | 43.0 | 6       | 7      | 6      | 7    | 60.6 | 144  | 156     | 168  | 7       | 6   | 70.5      | 5 | 12   | 5                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 16               | 17   | 10   | 10   | 6             | 7   | 6       | 6.5    | 63.1   | 36.0   | 40.0 | 40.0 | 7       | 13 | 81.5    | 7    | 13               | 51.0 | 6       | 7      | 6      | 6.5  | 57.8 | 145  | 157     | 169  | 7       | 6   | 70.0      | 5 | 12   | 5                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 17               | 19   | 11   | 10   | 6             | 7   | 6       | 6.5    | 62.3   | 37.0   | 37.0 | 41.0 | 7       | 12 | 80.0    | 7    | 12               | 50.5 | 6       | 6      | 6      | 7.5  | 56.5 | 147  | 159     | 171  | 7       | 6   | 70.0      | 5 | 12   | 5                                     | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 19               | 21   | 12   | 10   | 6             | 6.5 | 6       | 7      | 61.5   | 39.0   | 39.0 | 43.0 | 7       | 12 | 78.5    | 7    | 12               | 50.5 | 7       | 8      | 6      | 8    | 55.8 | 149  | 161     | 173  | 7       | 6   | 70.0      | 5 | 12   | 5                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 20               | 22   | 12   | 10   | 6             | 6.5 | 6       | 6.5    | 60.3   | 40.0   | 40.0 | 44.0 | 7       | 12 | 78.0    | 7    | 12               | 50.0 | 7       | 7.5    | 6      | 7    | 54.6 | 150  | 162     | 174  | 7       | 6   | 70.0      | 5 | 12   | 5                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 22               | 24   | 12   | 10   | 6             | 6   | 6       | 6      | 59.3   | 42.0   | 46.0 | 46.0 | 7       | 12 | 77.0    | 7    | 12               | 50.0 | 7       | 7      | 6      | 6.5  | 54.0 | 152  | 164     | 176  | 7       | 6   | 69.5      | 5 | 12   | 5                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 23               | 25   | 13   | 10   | 7             | 7.5 | 6       | 6      | 59.1   | 43.0   | 43.0 | 47.0 | 8       | 15 | 84.5    | 8    | 15               | 57.5 | 7       | 6.5    | 6      | 7    | 53.6 | 153  | 165     | 177  | 8       | 7   | 75.5      | 5 | 12   | 5                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 25               | 27   | 13   | 10   | 7             | 7   | 6       | 6      | 58.4   | 45.0   | 45.0 | 49.0 | 8       | 15 | 83.5    | 8    | 15               | 57.5 | 7       | 6.5    | 6      | 7    | 53.1 | 155  | 167     | 179  | 8       | 7   | 75.5      | 5 | 12   | 5                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 27               | 29   | 14   | 10   | 7             | 6.5 | 6       | 6      | 58.6   | 51.0   | 51.0 | 51.0 | 8       | 15 | 82.5    | 8    | 15               | 57.0 | 7       | 6.5    | 6      | 7.5  | 53.3 | 157  | 169     | 181  | 8       | 7   | 75.5      | 5 | 12   | 5                                     | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 28               | 31   | 14   | 10   | 7             | 6.5 | 6       | 6      | 58.3   | 52.0   | 52.0 | 52.0 | 8       | 14 | 82.0    | 8    | 14               | 57.0 | 7       | 6.5    | 6      | 7.5  | 52.9 | 159  | 171     | 183  | 8       | 7   | 75.5      | 5 | 12   | 5                                     | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 30               | 33   | 15   | 10   | 7             | 6   | 6       | 6      | 58.8   | 54.0   | 54.0 | 54.0 | 8       | 15 | 80.5    | 8    | 15               | 56.5 | 7       | 6.5    | 6      | 7    | 53.3 | 161  | 173     | 185  | 8       | 6.5 | 75.5      | 5 | 12   | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 31               | 34   | 15   | 10   | 8             | 7.5 | 7       | 8      | 63.5   | 55.0   | 55.0 | 55.0 | 8       | 15 | 79.5    | 8    | 15               | 56.0 | 7       | 6      | 6      | 7    | 53.1 | 162  | 174     | 186  | 8       | 6.5 | 75.5      | 5 | 12   | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 32               | 35   | 15   | 10   | 8             | 7.5 | 7       | 7      | 63.3   | 56.0   | 56.0 | 56.0 | 8       | 14 | 79.0    | 8    | 14               | 55.5 | 7       | 6      | 6      | 6.5  | 53.0 | 163  | 175     | 187  | 8       | 6.5 | 75.5      | 5 | 12   | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 33               | 37   | 16   | 10   | 8             | 7   | 7       | 7.5    | 64.0   | 57.0   | 57.0 | 57.0 | 8       | 14 | 77.5    | 8    | 14               | 55.0 | 7       | 6      | 6      | 6.5  | 53.5 | 165  | 177     | 189  | 8       | 6   | 75.5      | 5 | 12   | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 34               | 38   | 16   | 10   | 8             | 7   | 7       | 7.5    | 62.4   | 58.0   | 58.0 | 58.0 | 8       | 14 | 76.5    | 8    | 14               | 54.0 | 7       | 6      | 6      | 6    | 51.9 | 166  | 178     | 190  | 8       | 6   | 75.5      | 5 | 12   | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 35               | 40   | 16   | 10   | 8             | 6.5 | 7       | 7      | 62.4   | 59.0   | 59.0 | 59.0 | 8       | 13 | 75.0    | 8    | 13               | 53.5 | 7       | 6      | 6      | 6    | 52.0 | 168  | 180     | 192  | 9       | 7   | 81.5      | 5 | 12   | 6                                     | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 36               | 41   | 17   | 10   | 8             | 6   | 7       | 7.5    | 63.1   | 60.0   | 60.0 | 66.0 | 8       | 12 | 74.5    | 8    | 12               | 52.5 | 8       | 7.5    | 7      | 8    | 55.5 | 169  | 181     | 193  | 9       | 7   | 81.5      | 5 | 12   | 6                                     | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 38               | 42   | 17   | 10   | 8             | 6   | 7       | 7.5    | 62.9   | 62.0   | 62.0 | 68.0 | 8       | 12 | 73.5    | 8    | 12               | 50.0 | 8       | 7.5    | 7      | 7.5  | 55.8 | 170  | 182     | 194  | 9       | 7   | 81.5      | 5 | 12   | 6                                     | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 39               | 43   | 18   | 10   | 8             | 6   | 7       | 7.5    | 63.8   | 63.0   | 63.0 | 69.0 | 8       | 12 | 73.0    | 8    | 12               | 49.0 | 8       | 7      | 7      | 7.5  | 56.1 | 171  | 183     | 195  | 9       | 7   | 81.5      | 5 | 12   | 6                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 40               | 44   | 18   | 10   | 8             | 6   | 7       | 7.5    | 63.6   | 70.0   | 70.0 | 70.0 | 8       | 12 | 72.0    | 8    | 12               | 48.5 | 8       | 6.5    | 7      | 7    | 56.3 | 172  | 184     | 196  | 9       | 6.5 | 81.5      | 5 | 12   | 6                                     | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 40               | 46   | 19   | 10   | 8             | 6   | 7       | 7      | 64.8   | 70.0   | 70.0 | 70.0 | 8       | 12 | 72.0    | 8    | 12               | 49.0 | 8       | 7      | 7      | 7    | 56.6 | 174  | 186     | 198  | 9       | 6.5 | 81.5      | 5 | 12   | 6                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 41               | 47   | 19   | 10   | 9             | 7.5 | 7       | 6.5    | 64.6   | 71.0   | 71.0 | 71.0 | 8       | 12 | 71.5    | 8    | 12               | 48.5 | 8       | 7      | 7      | 6.5  | 56.9 | 175  | 187     | 199  | 9       | 6   | 81.5      | 5 | 12   | 6                                     | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 16 FT |                     |    |    |    |               |      |         |      |      |        |        |        |         |      |       |         |                  |      |         |      |         |        |        |        |      |      |         |      |           |         |      |         | HEIGHT (HT) = 14 FT OR 15 FT OR 16 FT |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|--------|--------|--------|---------|------|-------|---------|------------------|------|---------|------|---------|--------|--------|--------|------|------|---------|------|-----------|---------|------|---------|---------------------------------------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |        |        |         |      |       |         | BOTTOM SLAB BARS |      |         |      |         |        |        |        |      |      |         |      | WALL BARS |         |      |         |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |        |        |        | H1 BARS |      |       | H2 BARS |                  |      | A2 BARS |      | J4 BARS |        |        |        |      |      | H3 BARS |      |           | B1 BARS |      | B2 BARS |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |        |        | SIZE    | SPA. | C5    | SIZE    | SPA.             | C6   | SIZE    | SPA. | C4      | K3     |        |        | SIZE | SPA. | C7      | SIZE | SPA.      | SIZE    | SPA. | G1      |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=14' | HT=15' | HT=16' |         |      |       |         |                  |      |         |      |         | HT=14' | HT=15' | HT=16' |      |      |         |      |           |         |      |         |                                       |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 13 | 12 | 13 | 6             | 7.5  | 6       | 8    | 82.9 | 35.0   | 35.0   | 39.0   | 6       | 15   | 160.5 | 6       | 15               | 53.0 | 5       | 6    | 6       | 7      | 101.1  | 177    | 189  | 201  | 6       | 6    | 70.5      | 5       | 10   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 17                  | 14 | 12 | 13 | 6             | 7.5  | 6       | 8.5  | 82.9 | 37.0   | 37.0   | 41.0   | 6       | 14   | 160.5 | 6       | 14               | 50.0 | 6       | 8    | 6       | 7      | 95.1   | 178    | 190  | 202  | 7       | 7    | 73.0      | 5       | 12   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 17                  | 14 | 12 | 13 | 6             | 7    | 6       | 7    | 99.8 | 37.0   | 37.0   | 41.0   | 7       | 15   | 160.5 | 7       | 15               | 50.0 | 6       | 8    | 6       | 6      | 95.1   | 178    | 190  | 202  | 7       | 6    | 73.0      | 5       | 11   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 13                  | 13 | 12 | 13 | 6             | 7    | 6       | 7    | 99.8 | 37.0   | 37.0   | 37.0   | 7       | 15   | 94.0  | 7       | 15               | 46.0 | 6       | 8.5  | 6       | 6      | 86.1   | 177    | 189  | 201  | 7       | 6    | 72.0      | 5       | 11   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 13                  | 15 | 12 | 13 | 6             | 7    | 6       | 6.5  | 82.6 | 37.0   | 37.0   | 37.0   | 7       | 14   | 77.5  | 7       | 14               | 44.5 | 6       | 7.5  | 6       | 6.5    | 82.5   | 179    | 191  | 203  | 7       | 6    | 71.5      | 5       | 12   | 5       | 7                                     | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 14                  | 16 | 13 | 13 | 6             | 7.5  | 6       | 6.5  | 76.6 | 38.0   | 38.0   | 38.0   | 7       | 13   | 74.5  | 7       | 13               | 44.0 | 6       | 7    | 6       | 6.5    | 77.6   | 180    | 192  | 204  | 7       | 6    | 71.0      | 5       | 12   | 5       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 15                  | 18 | 13 | 13 | 6             | 6.5  | 6       | 6    | 79.5 | 39.0   | 39.0   | 39.0   | 7       | 13   | 80.5  | 7       | 13               | 51.5 | 6       | 6.5  | 6       | 6      | 75.6   | 182    | 194  | 206  | 7       | 6    | 71.0      | 5       | 12   | 5       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 17                  | 19 | 14 | 13 | 6             | 7    | 6       | 6    | 77.8 | 41.0   | 41.0   | 41.0   | 7       | 13   | 79.5  | 7       | 13               | 51.5 | 6       | 6    | 6       | 6      | 73.1   | 183    | 195  | 207  | 7       | 6    | 70.5      | 5       | 12   | 5       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 18                  | 21 | 15 | 13 | 6             | 7    | 6       | 6    | 76.3 | 42.0   | 42.0   | 42.0   | 7       | 12   | 78.5  | 7       | 12               | 51.0 | 7       | 8    | 6       | 6      | 71.8   | 185    | 197  | 209  | 7       | 6    | 70.5      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 20                  | 22 | 15 | 13 | 6             | 6.5  | 7       | 7.5  | 79.9 | 44.0   | 44.0   | 44.0   | 7       | 12   | 78.0  | 7       | 12               | 51.0 | 7       | 7.5  | 6       | 6      | 70.3   | 186    | 198  | 210  | 7       | 6    | 70.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 22                  | 24 | 15 | 13 | 6             | 6    | 7       | 7    | 78.8 | 46.0   | 46.0   | 52.0   | 7       | 12   | 77.5  | 7       | 12               | 51.0 | 7       | 7    | 7       | 7      | 72.4   | 188    | 200  | 212  | 7       | 6    | 70.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 23                  | 25 | 16 | 13 | 7             | 7.5  | 7       | 7    | 78.0 | 47.0   | 47.0   | 53.0   | 8       | 15   | 85.0  | 8       | 15               | 58.5 | 7       | 6    | 7       | 7.5    | 71.4   | 189    | 201  | 213  | 8       | 7    | 76.0      | 5       | 12   | 6       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 25                  | 27 | 17 | 13 | 7             | 7    | 7       | 7.5  | 77.8 | 49.0   | 49.0   | 49.0   | 7       | 12   | 76.0  | 7       | 12               | 50.5 | 7       | 6    | 6       | 6      | 68.0   | 191    | 203  | 215  | 8       | 7    | 76.0      | 5       | 12   | 6       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 26                  | 29 | 17 | 13 | 7             | 7    | 7       | 7    | 76.9 | 50.0   | 50.0   | 56.0   | 8       | 15   | 83.5  | 8       | 15               | 58.5 | 7       | 6.5  | 7       | 7.5    | 70.4   | 193    | 205  | 217  | 8       | 7    | 76.0      | 5       | 12   | 6       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 28                  | 31 | 18 | 13 | 7             | 6.5  | 7       | 7    | 76.9 | 52.0   | 52.0   | 52.0   | 8       | 15   | 82.5  | 8       | 15               | 58.0 | 7       | 6.5  | 6       | 6      | 67.1   | 195    | 207  | 219  | 8       | 7    | 76.5      | 5       | 12   | 6       | 7                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 29                  | 33 | 19 | 13 | 7             | 6    | 7       | 7    | 77.1 | 53.0   | 53.0   | 53.0   | 8       | 15   | 82.0  | 8       | 15               | 58.0 | 7       | 6    | 6       | 6      | 67.1   | 197    | 209  | 221  | 8       | 6.5  | 76.5      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 31                  | 34 | 19 | 13 | 8             | 7.5  | 7       | 6.5  | 76.8 | 55.0   | 55.0   | 55.0   | 8       | 15   | 80.5  | 8       | 15               | 57.0 | 7       | 6    | 6       | 6      | 67.0   | 198    | 210  | 222  | 8       | 6.5  | 76.0      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 32                  | 36 | 20 | 13 | 8             | 7.5  | 7       | 6.5  | 77.3 | 56.0   | 56.0   | 56.0   | 8       | 14   | 79.5  | 8       | 14               | 56.5 | 7       | 6    | 6       | 6      | 67.3   | 200    | 212  | 224  | 8       | 6    | 76.5      | 5       | 12   | 6       | 6.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 33                  | 37 | 21 | 13 | 8             | 7    | 7       | 6.5  | 77.6 | 57.0   | 57.0   | 57.0   | 8       | 14   | 78.5  | 8       | 14               | 55.5 | 7       | 6    | 6       | 6      | 67.3   | 201    | 213  | 225  | 8       | 6    | 76.5      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 34                  | 38 | 21 | 13 | 8             | 7    | 7       | 6.5  | 75.5 | 58.0   | 58.0   | 58.0   | 8       | 14   | 77.5  | 8       | 14               | 55.0 | 8       | 7    | 6       | 6      | 64.9   | 202    | 214  | 226  | 8       | 6    | 76.5      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 35                  | 40 | 21 | 13 | 8             | 6.5  | 7       | 6    | 75.5 | 59.0   | 59.0   | 59.0   | 8       | 13   | 76.5  | 8       | 13               | 54.0 | 8       | 7.5  | 6       | 6      | 65.1   | 204    | 216  | 228  | 9       | 7    | 82.0      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 36                  | 41 | 22 | 13 | 8             | 6.5  | 7       | 6    | 76.1 | 66.0   | 66.0   | 66.0   | 8       | 13   | 75.5  | 8       | 13               | 53.5 | 8       | 7.5  | 7       | 7.5    | 68.5   | 205    | 217  | 229  | 9       | 7    | 82.0      | 5       | 12   | 6       | 6                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 37                  | 42 | 23 | 13 | 8             | 6.5  | 7       | 6.5  | 76.9 | 67.0   | 67.0   | 67.0   | 8       | 12   | 75.0  | 8       | 12               | 52.5 | 8       | 6.5  | 7       | 7.5    | 68.8   | 206    | 218  | 230  | 9       | 7    | 82.5      | 5       | 12   | 7       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 38                  | 44 | 24 | 13 | 8             | 6    | 7       | 6    | 77.6 | 68.0   | 68.0   | 68.0   | 8       | 12   | 74.5  | 8       | 12               | 52.0 | 8       | 7    | 7       | 7      | 69.4   | 208    | 220  | 232  | 9       | 6.5  | 82.5      | 5       | 12   | 7       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 39                  | 45 | 25 | 13 | 8             | 6    | 7       | 6    | 78.4 | 69.0   | 69.0   | 69.0   | 8       | 12   | 74.0  | 8       | 12               | 51.0 | 8       | 7    | 7       | 7      | 69.8   | 209    | 221  | 233  | 9       | 6.5  | 82.5      | 5       | 12   | 7       | 7.5                                   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 40                  | 46 | 26 | 13 | 8             | 6    | 7       | 6    | 79.1 | 70.0   | 70.0   | 70.0   | 8       | 12   | 73.5  | 8       | 12               | 50.0 | 8       | 6.5  | 7       | 7      | 70.1   | 210    | 222  | 234  | 9       | 6.5  | 82.5      | 5       | 12   | 7       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 41                  | 47 | 27 | 13 | 9             | 7.5  | 7       | 6    | 79.9 | 71.0   | 71.0   | 71.0   | 8       | 12   | 73.0  | 8       | 12               | 49.5 | 8       | 6    | 7       | 6.5    | 70.5   | 211    | 223  | 235  | 9       | 6    | 82.5      | 5       | 12   | 7       | 8                                     | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
DOUBLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 16 FEET  
HEIGHT (HT): 14 THRU 16 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

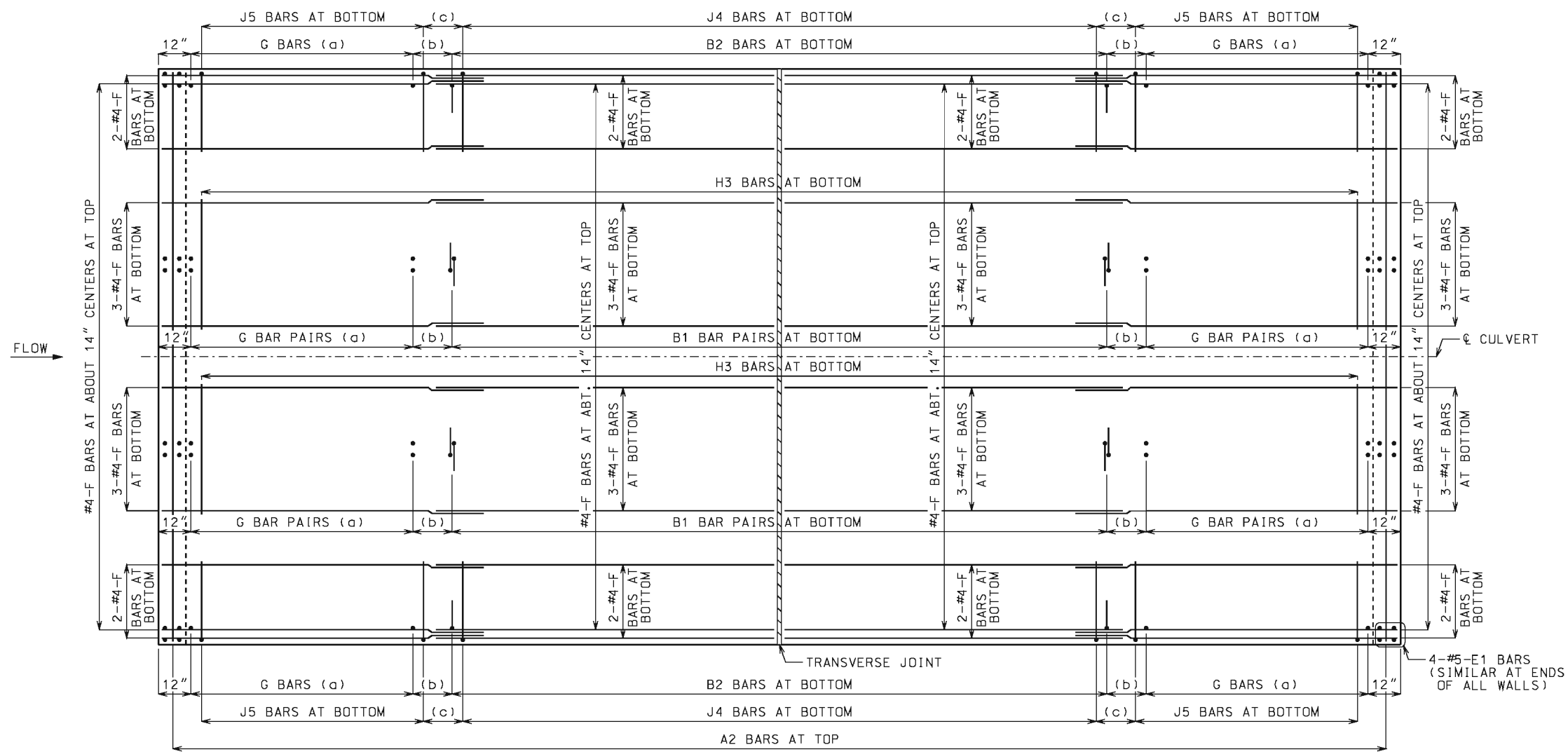
703.47A

SHEET NO.  
27 OF 27

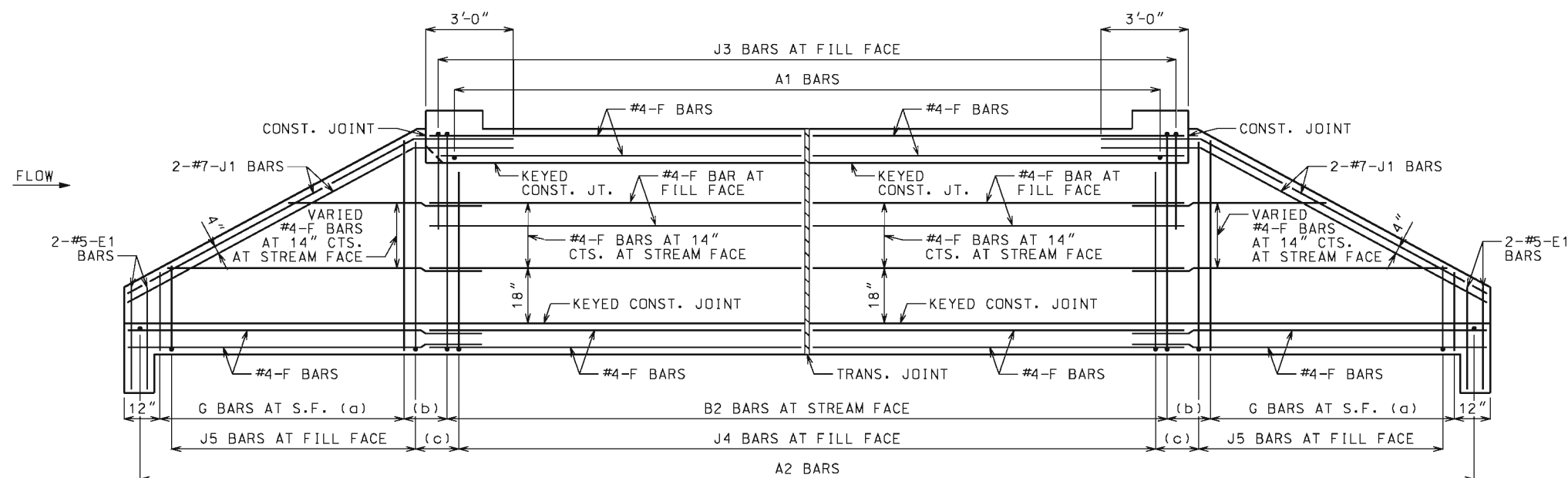
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.







PLAN OF BOTTOM SLAB



ELEVATION OF EXTERIOR WALL  
J1 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.86.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

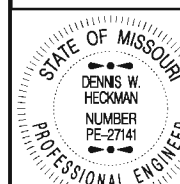
(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
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THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
TRIPLE BOX CULVERT

SKEW: SQUARED  
WINGS: STRAIGHT

REINFORCEMENT

DATE EFFECTIVE: 12/01/2011  
DATE PREPARED: 5/13/2015

703.80H

SHEET NO.  
1 OF 3





PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



(b) NOT REQUIRED FOR CLEAR SPANS  $\leq 10'-0''$   
 #8 FOR CLEAR SPAN  $> 10'-0''$   
 #9 FOR CLEAR SPAN  $> 13'-0''$

IF D2 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



GENERAL NOTES:

FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW  
DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".

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COMMISSION

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CONCRETE  
TRIPLE BOX CULVERT

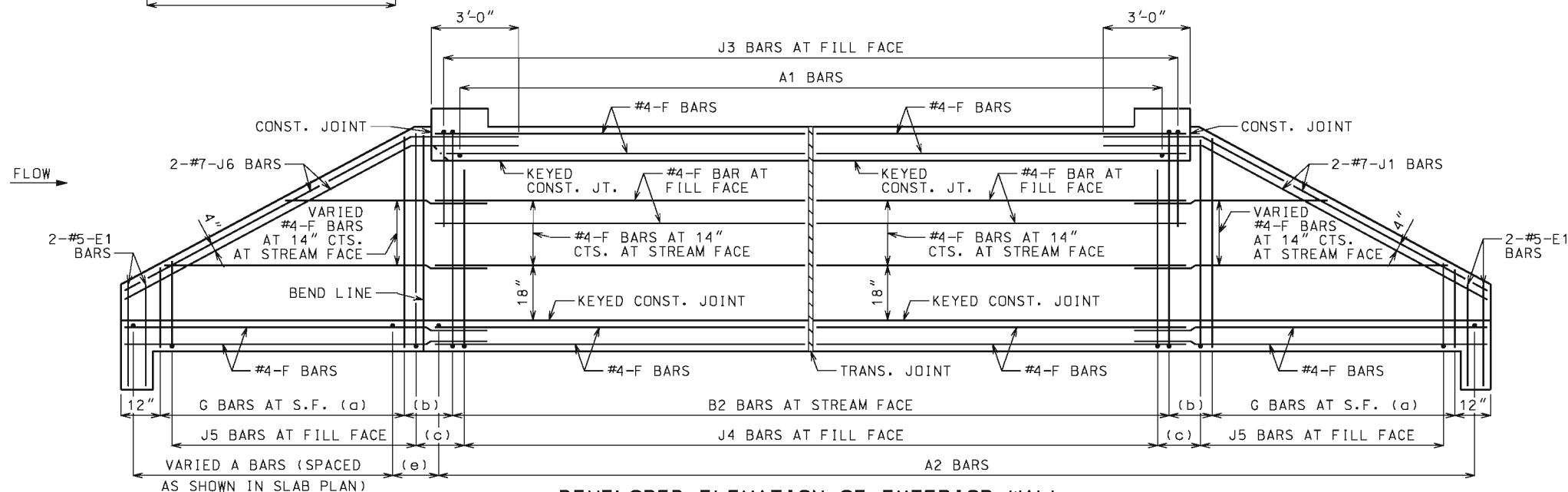
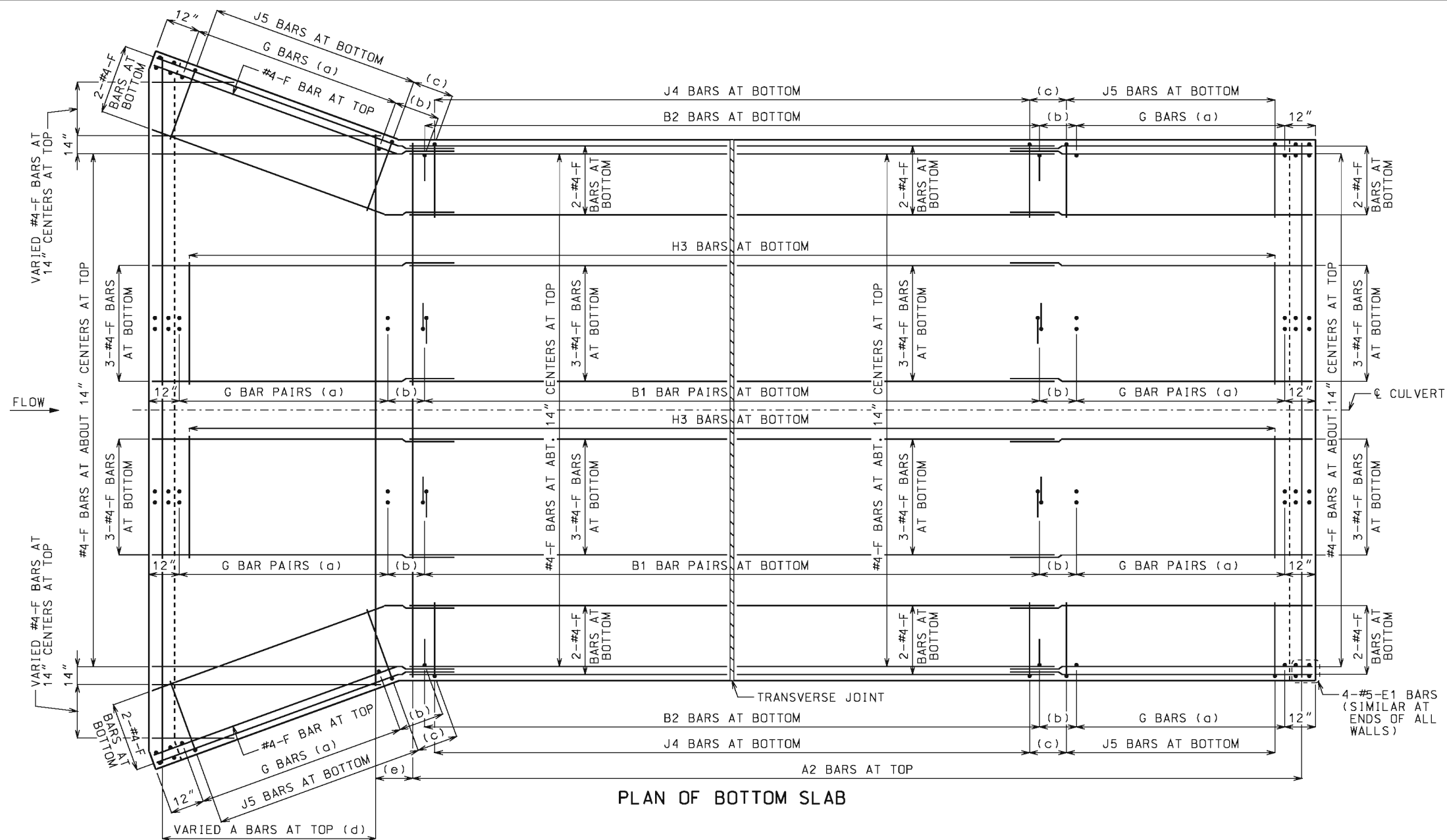
SKEW: SQUARED  
WINGS: STRAIGHT

## SECTIONS

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

703.80H

SHEET NO.  
3 OF 3



**DEVELOPED ELEVATION OF EXTERIOR WALL**  
J1 AND J6 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET.  
USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.86.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION. SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

**CONCRETE  
TRIPLE BOX CULVERT**

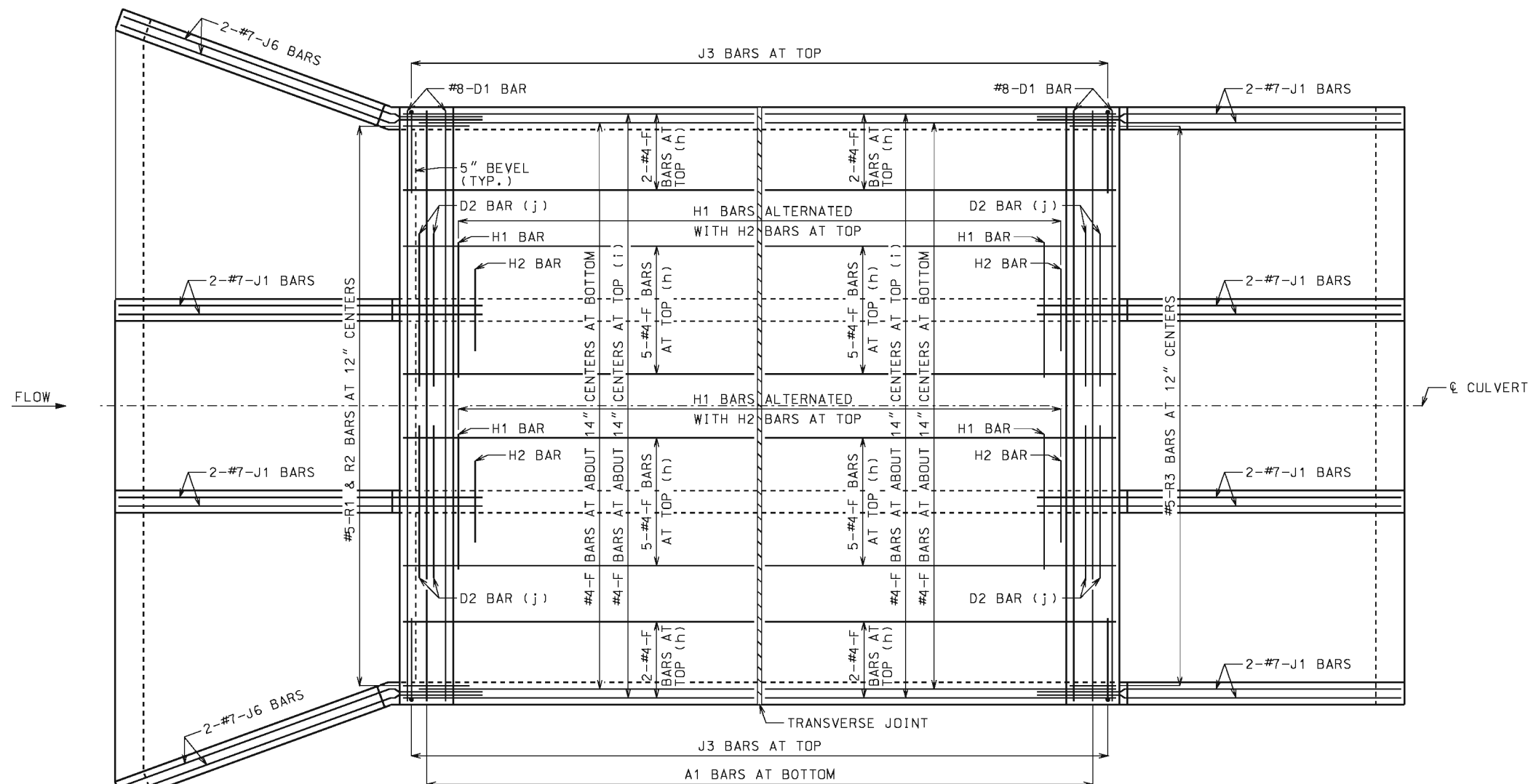
**SKEW: SQUARED  
WINGS: FLARED**

**REINFORCEMENT**

DATE EFFECTIVE: 12/01/2011  
DATE PREPARED: 5/13/2015

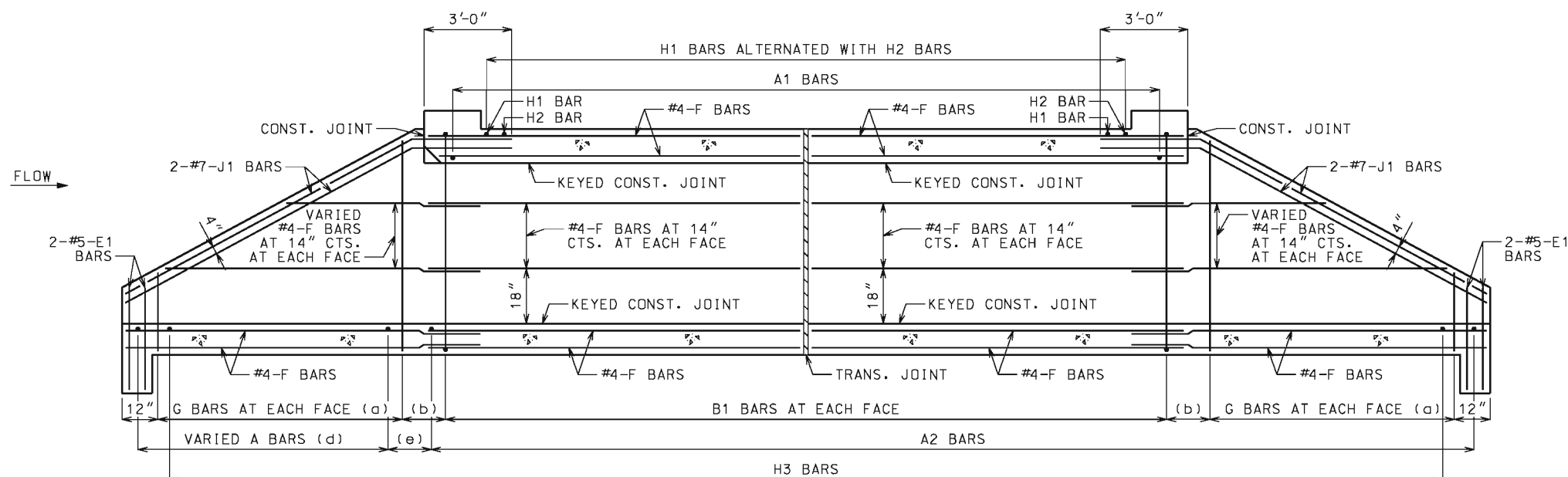
**703.81H**

SHEET NO.  
1 OF 3



**PLAN OF TOP SLAB**

B BARS IN WALLS ARE NOT SHOWN FOR CLARITY.  
FOR PLACEMENT, SEE SHEET 1 OF 3.



**SECTION NEAR INTERIOR WALL**

J1 BARS MAY BE BENT IN FIELD OR SHOP.

**GENERAL NOTES:**

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2\".

LAP LONGITUDINAL BARS A MINIMUM OF 23\" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12\" MAXIMUM

(c) NOT SPECIFIED ON THIS SHEET

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

(f) NOT SPECIFIED ON THIS SHEET

(g) NOT SPECIFIED ON THIS SHEET

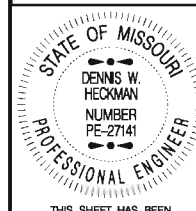
(h) FOR DESIGN FILLS OVER 2'-0\"

(i) FOR DESIGN FILLS 2'-0\" OR LESS

(j) NOT REQUIRED FOR CLEAR SPANS ≤ 10'-0\"

#8 FOR CLEAR SPAN > 10'-0\"  
#9 FOR CLEAR SPAN > 13'-0\"

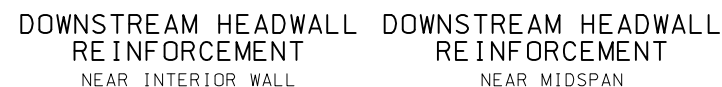
IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR 1/4 CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

|                                                                                                                                                                                                                                               |                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                                                                         |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                             | <p><b>CONCRETE<br/>TRIPLE BOX CULVERT</b></p> <p><b>SKEW: SQUARED<br/>WINGS: FLARED</b></p> <p><b>REINFORCEMENT</b></p> |
| <p>DATE EFFECTIVE: 12/01/2011</p> <p>DATE PREPARED: 5/13/2015</p>                                                                                                                                                                             | <p><b>703.81H</b></p>                                                                                                   |
| <p>SHEET NO.<br/><b>2 OF 3</b></p>                                                                                                                                                                                                            |                                                                                                                         |



PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SUB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



(b) NOT REQUIRED FOR CLEAR SPANS  $\leq 10'-0''$   
 #8 FOR CLEAR SPAN  $> 10'-0''$   
 #9 FOR CLEAR SPAN  $> 13'-0''$

IF D2 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



GENERAL NOTES:

FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW  
DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

CONCRETE  
TRIPLE BOX CULVERT

SKEW: SQUARED  
WINGS: FLARED

## SECTIONS

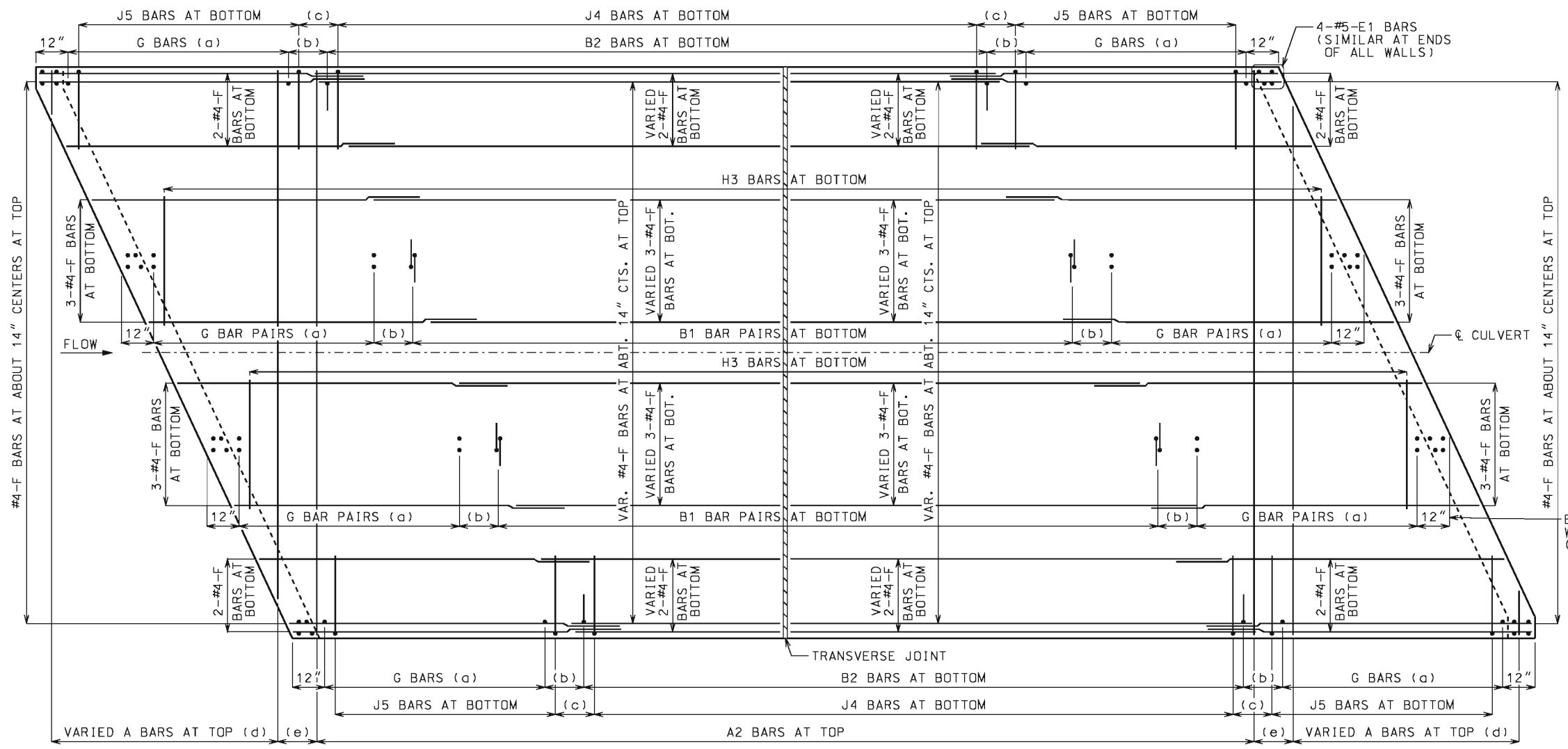
DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

703.81H

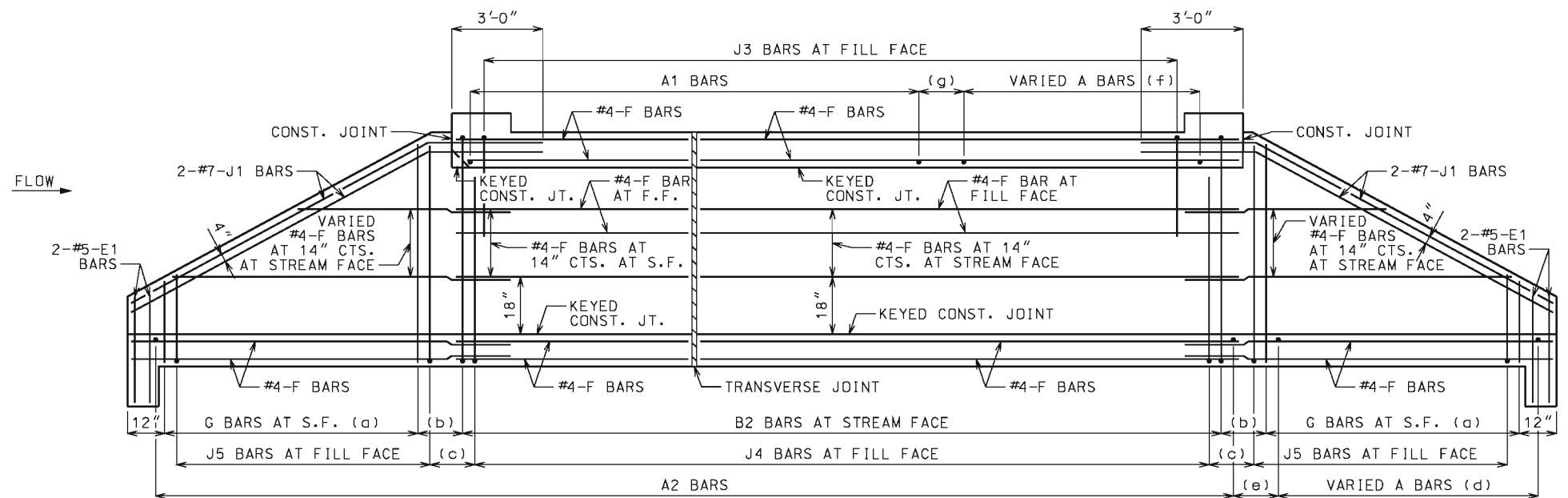
SHEET NO.  
3 OF 3

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED:





PLAN OF BOTTOM SLAB



ELEVATION OF EXTERIOR WALL  
J1 BARS MAY BE BENT IN FIELD OR SHOP.

# LAYING OUT TRANSVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.86.

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 1 1/2".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

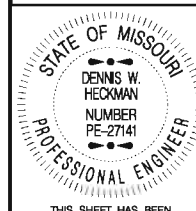
(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



CONCRETE  
TRIPLE BOX CULVERT

SKEW: LEFT ADVANCE  
WINGS: STRAIGHT

REINFORCEMENT

DATE EFFECTIVE: 12/01/2011  
DATE PREPARED: 5/13/2015

703.82H

SHEET NO.  
1 OF 3

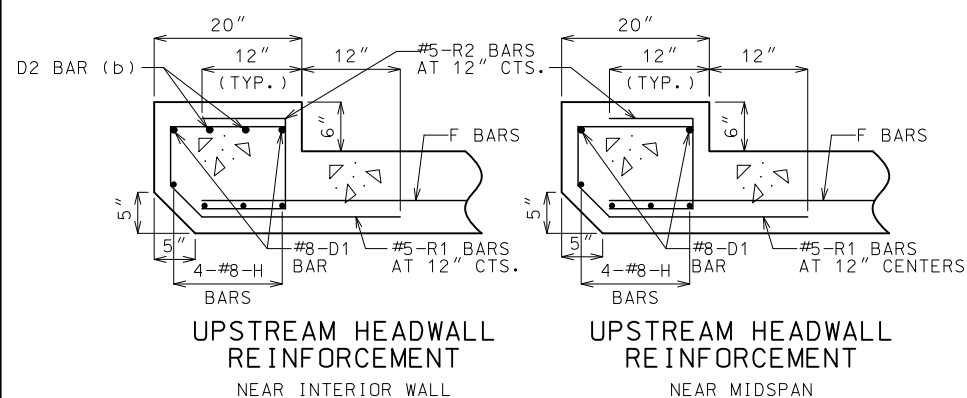
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.





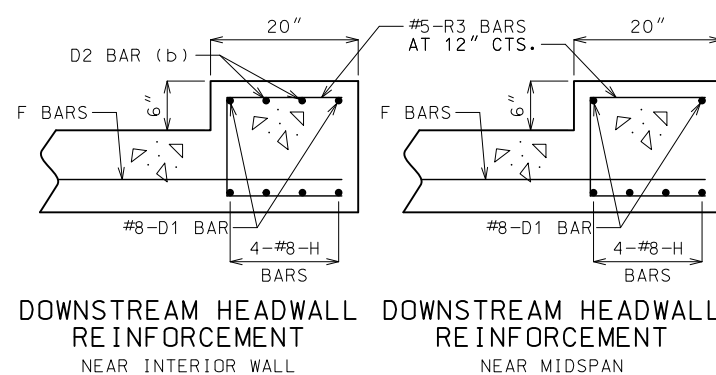
PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN THE SUBBASE AND DEWEYS WITH JOINTS SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



(b) NOT REQUIRED FOR CLEAR SPANS  $\leq 10'-0''$   
 #8 FOR CLEAR SPAN  $> 10'-0''$   
 #9 FOR CLEAR SPAN  $> 13'-0''$

IF D2 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



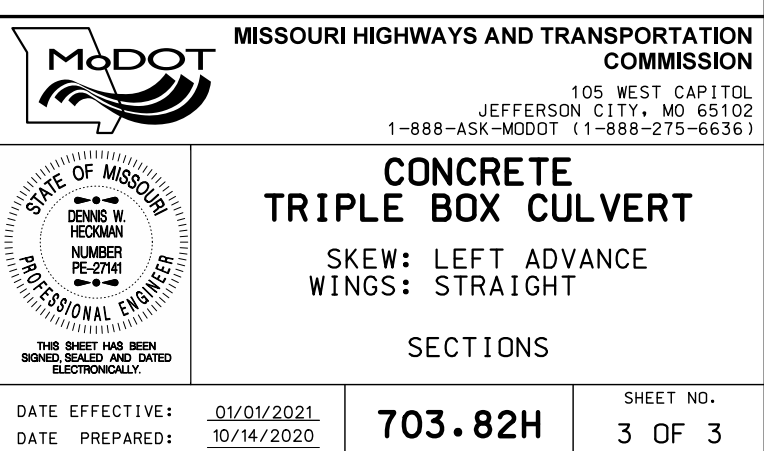
GENERAL NOTES:

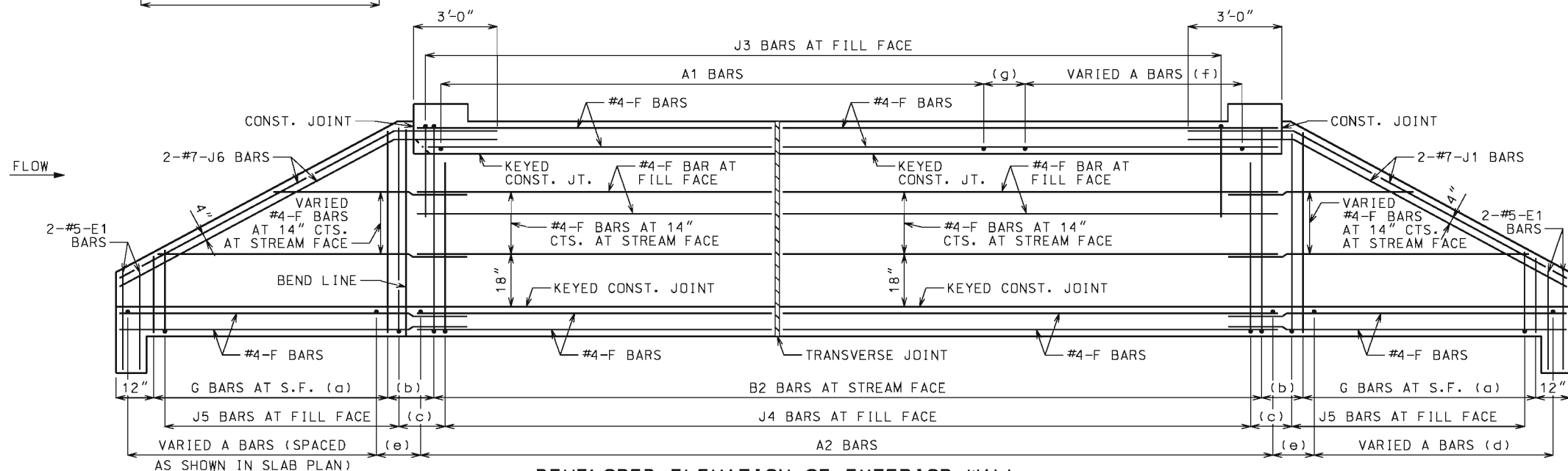
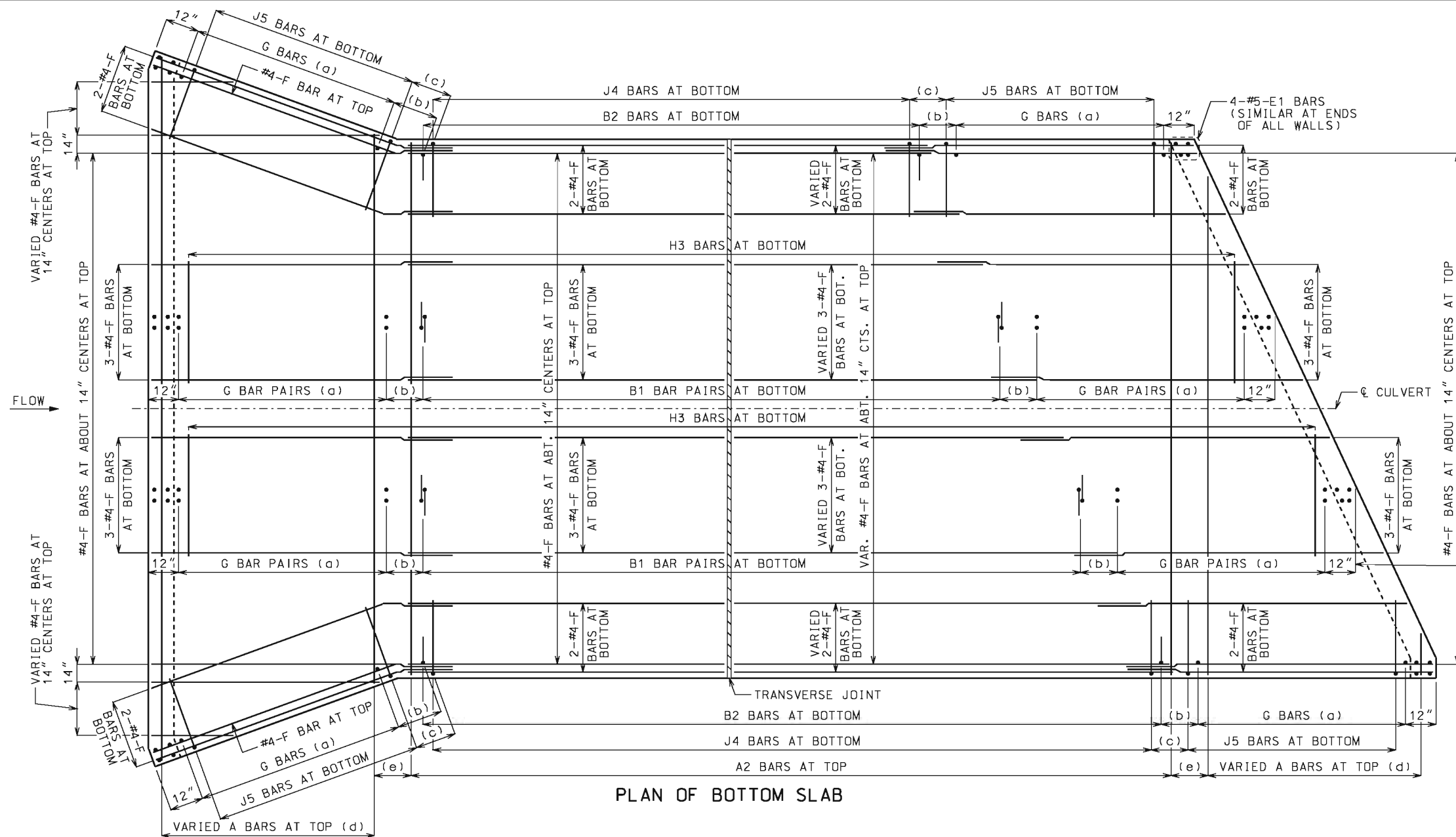
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW  
DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING  
STEEL SHALL BE  $1\frac{1}{2}$ ".





J1 AND J6 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

CUT SECTION LENGTHS UP TO 60 FEET

WHEN BARREL AND CUT SECTION LENGTH RESTRICTIONS REQUIRE TRANSVERSE JOINTS TO BE LOCATED UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS, THE JOINTS SHALL BE LOCATED TO MINIMIZE THE LENGTH OF JOINT UNDER THE TRAVELED WAY.

TRAVELED WAY IS THE ROADWAY WIDTH MINUS SHOULDER WIDTHS.

FOR CUT SECTION DETAILS, SEE 703.86.

END OF WALL (TYP.) (NOT SHOWN)

## GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND ELEVATION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

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(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

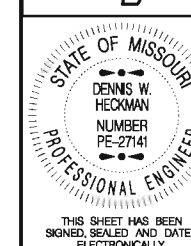
(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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CONCRETE  
TRIPLE BOX CULVERT

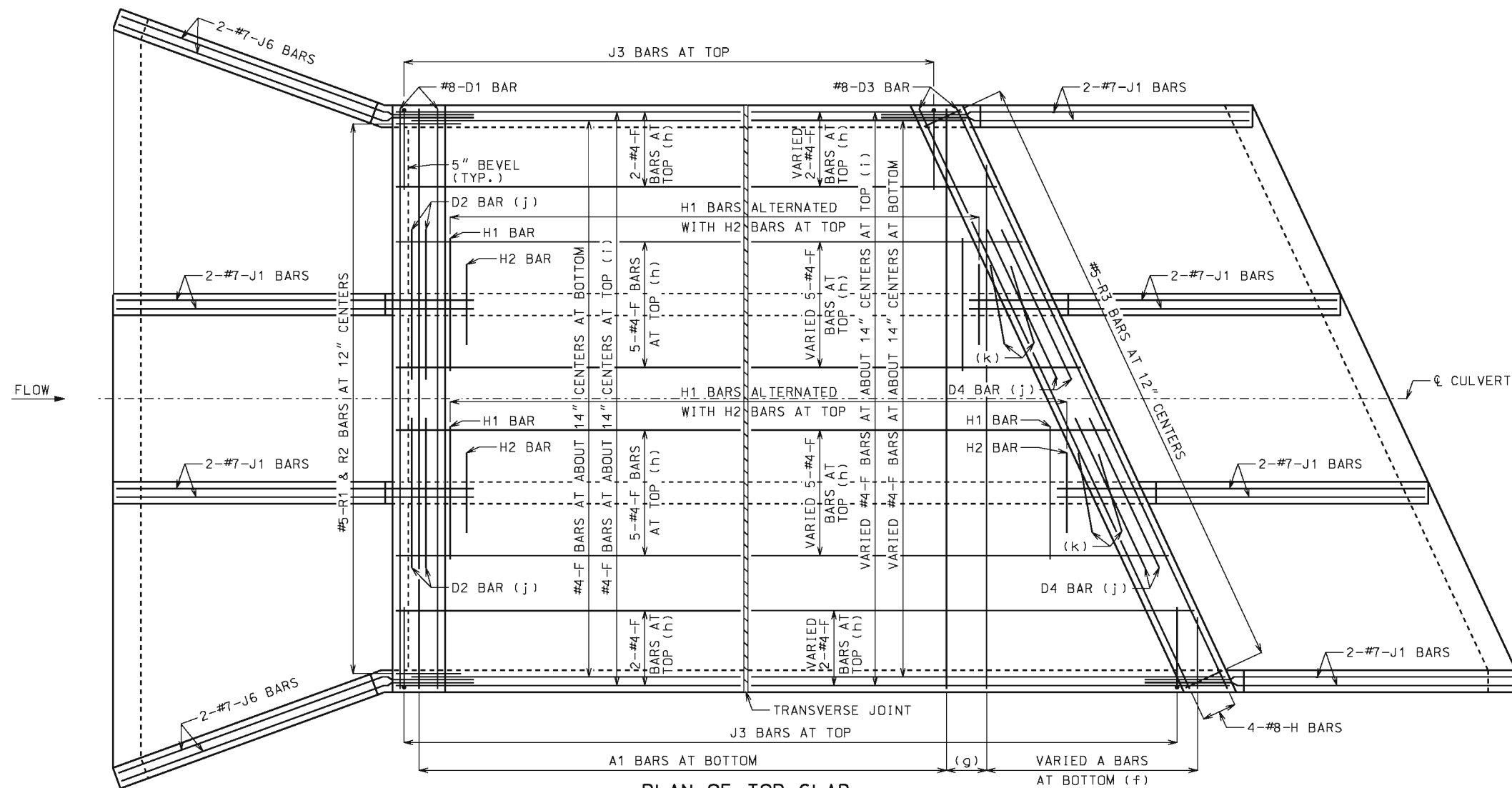
SKEW: LEFT ADVANCE  
WINGS: FLARED

REINFORCEMENT

DATE EFFECTIVE: 12/01/2011  
DATE PREPARED: 5/13/2015

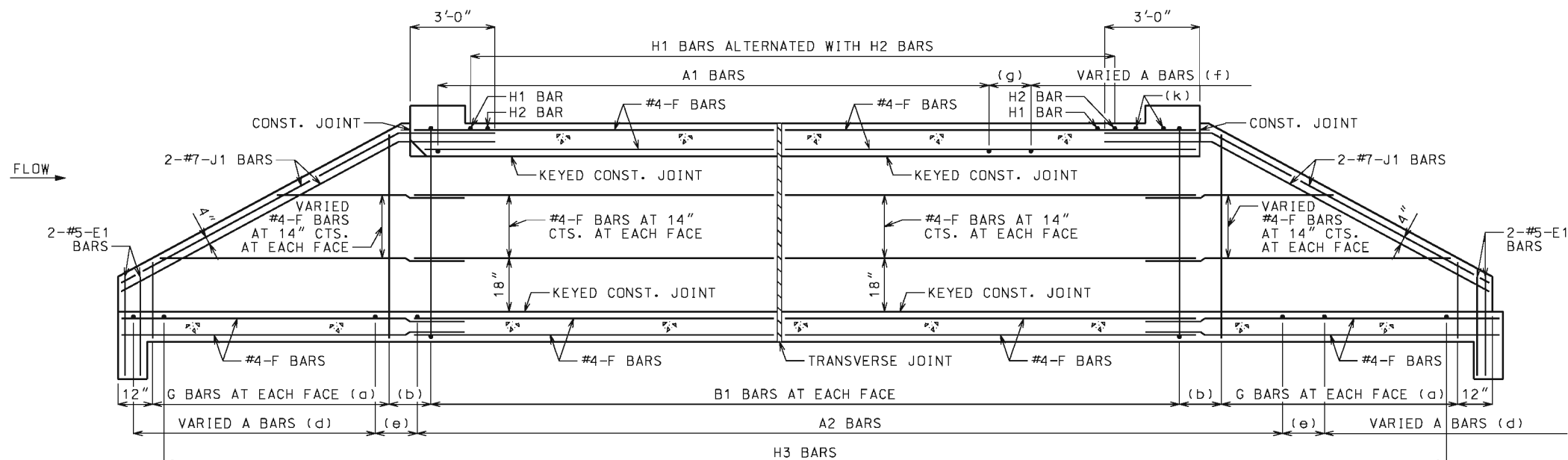
703.83H

SHEET NO.  
1 OF 3



**PLAN OF TOP SLAB**

B BARS IN WALLS ARE NOT SHOWN FOR CLARITY.  
FOR PLACEMENT, SEE SHEET 1 OF 3.



**SECTION NEAR INTERIOR WALL**

J1 BARS MAY BE BENT IN FIELD OR SHOP.

**GENERAL NOTES:**

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION, SEE SHEET 3 OF 3 FOR DETAILS.

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(b) VARIES, 12" MAXIMUM

(c) NOT SPECIFIED ON THIS SHEET

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING

(h) FOR DESIGN FILLS OVER 2'-0"

(i) FOR DESIGN FILLS 2'-0" OR LESS

(j) NOT REQUIRED FOR CLEAR SPANS  $\leq 10'-0"$

#8 FOR CLEAR SPAN  $> 10'-0"$

#9 FOR CLEAR SPAN  $> 13'-0"$

IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF  $\phi$  WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

(k) H2 BARS AS REQUIRED, QUANTITY OF BARS VARIES WITH SKEW.

|                                                                                                                                                                                                                                               |                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                   |
| <p><b>CONCRETE TRIPLE BOX CULVERT</b></p> <p>SKEW: LEFT ADVANCE<br/>WINGS: FLARED</p> <p><b>REINFORCEMENT</b></p>                                                                                                                             |                                                                   |
| <p>STATE OF MISSOURI</p> <p>DENNIS W. HECKMAN<br/>NUMBER PE-27141<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                           | <p>DATE EFFECTIVE: 12/01/2011</p> <p>DATE PREPARED: 5/13/2015</p> |
| <p>703.83H</p>                                                                                                                                                                                                                                | <p>SHEET NO.<br/>2 OF 3</p>                                       |

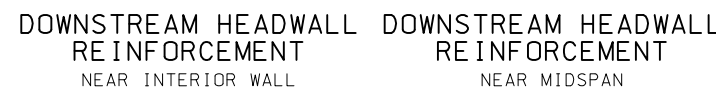


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FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SUB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



IF D2 AND D4 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



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THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATE  
ELECTRONICALLY.

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

CONCRETE  
TRIPLE BOX CULVERT

SKREW: LEFT ADVANCE  
WINGS: FLARED

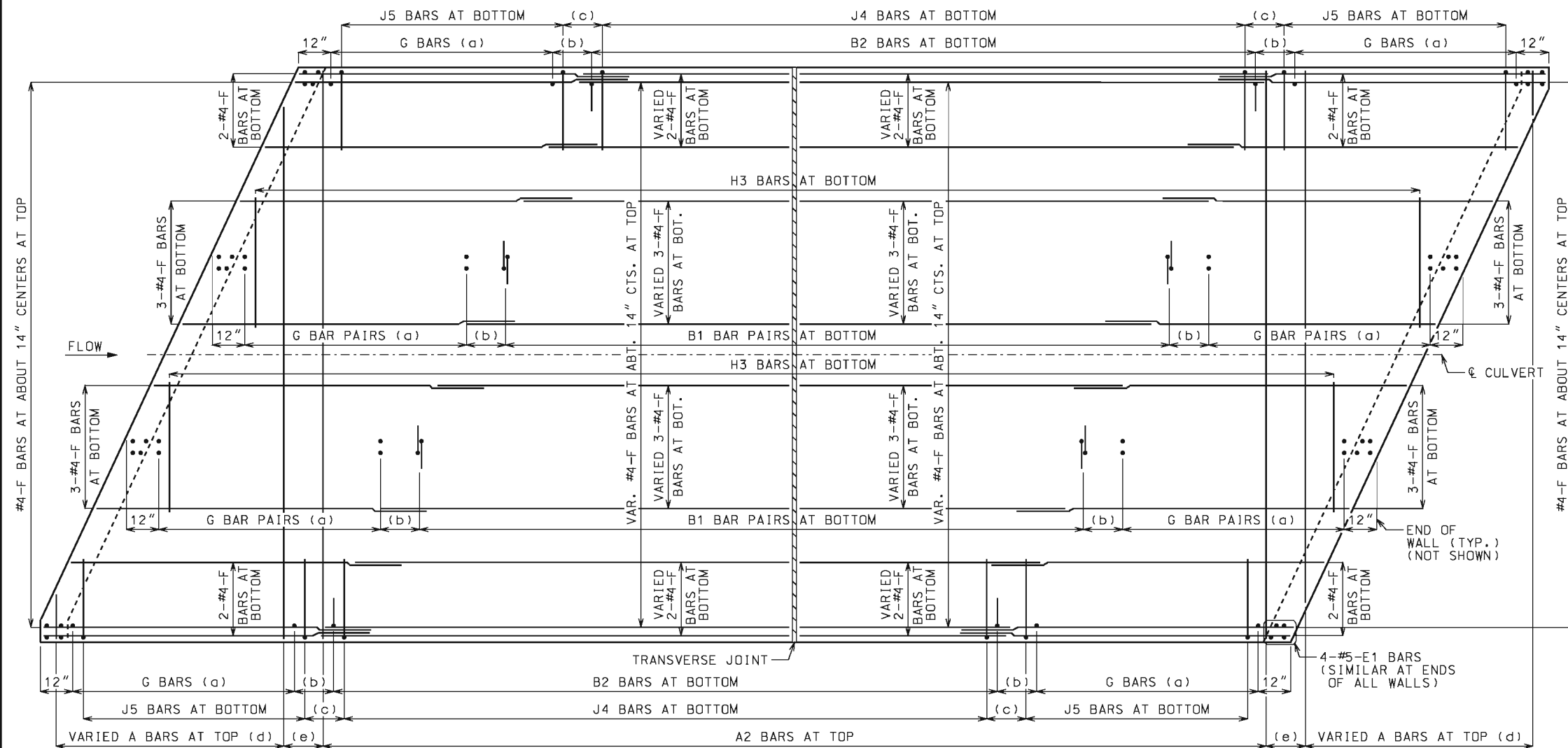
## SECTIONS

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

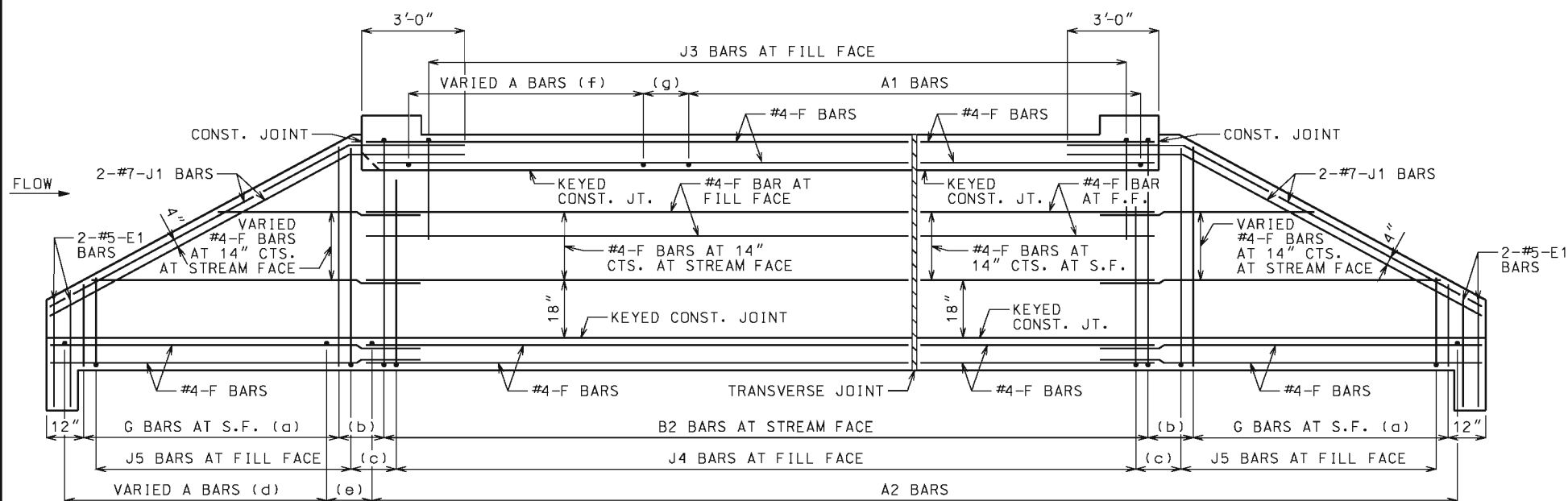
703.83H

SHEET NO.  
3 OF 3

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



PLAN OF BOTTOM SLAB



ELEVATION OF EXTERIOR WALL

J1 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET. USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

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BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

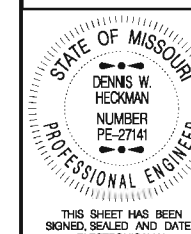
(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
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CONCRETE  
TRIPLE BOX CULVERT

SKEW: RIGHT ADVANCE  
WINGS: STRAIGHT

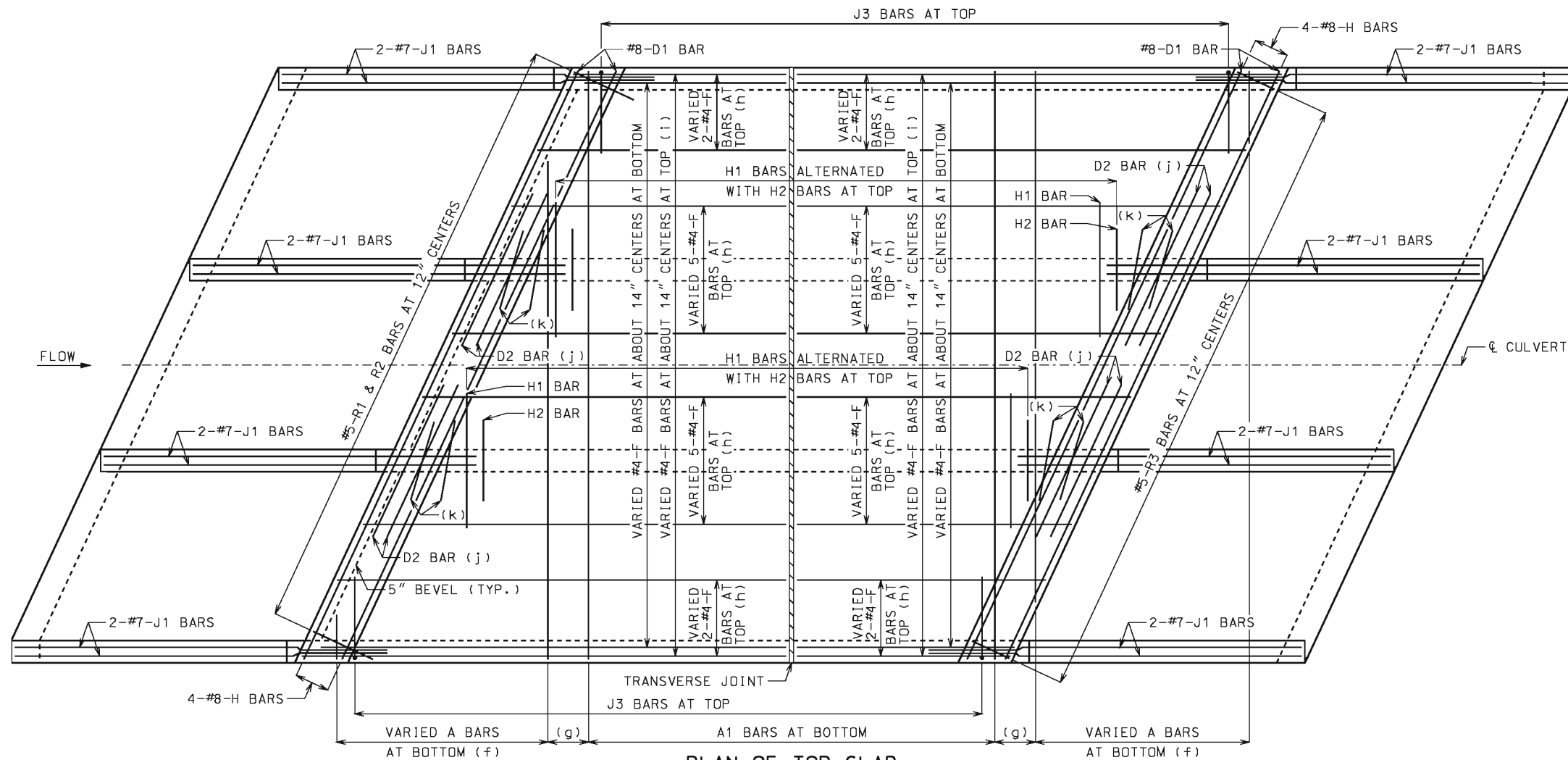
REINFORCEMENT

DATE EFFECTIVE: 12/01/2011  
DATE PREPARED: 5/13/2015

703.84H

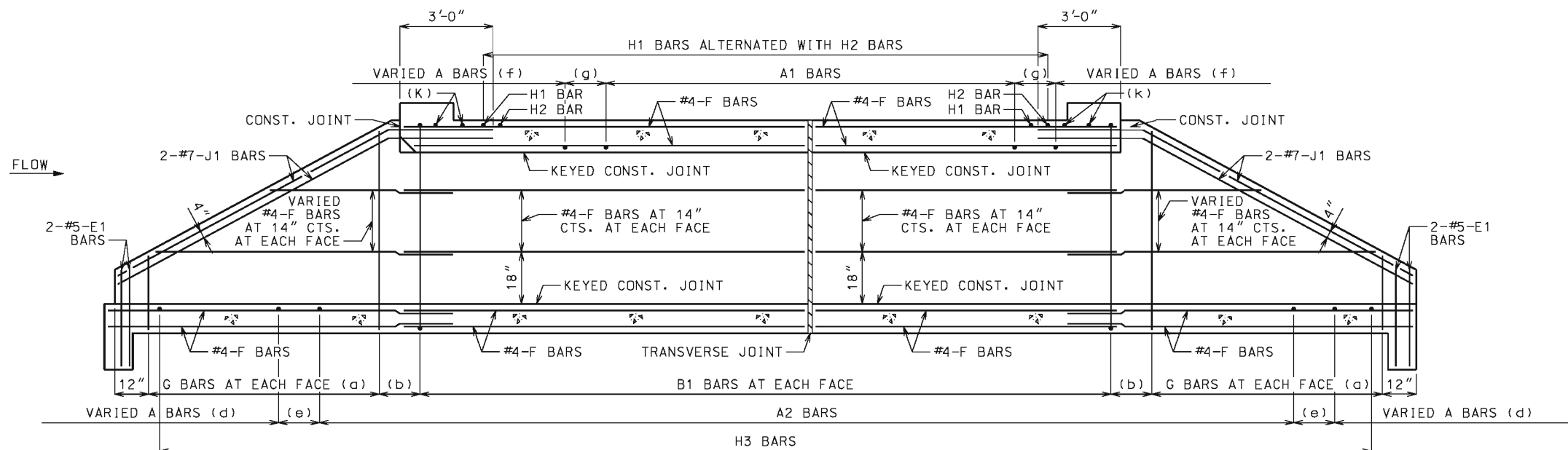
SHEET NO.  
1 OF 3





**PLAN OF TOP SLAB**

B BARS IN WALLS ARE NOT SHOWN FOR CLARITY.  
FOR PLACEMENT, SEE SHEET 1 OF 3.



**SECTION NEAR INTERIOR WALL**

J1 BARS MAY BE BENT IN FIELD OR SHOP.

**GENERAL NOTES:**

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

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(a) SAME SIZE AND SPACING AS ADJACENT B BARS

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(c) NOT SPECIFIED ON THIS SHEET

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(e) A2 BAR SPACING

(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING

(h) FOR DESIGN FILLS OVER 2'-0"

(i) FOR DESIGN FILLS 2'-0" OR LESS

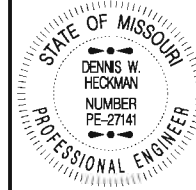
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(k) H2 BARS AS REQUIRED, QUANTITY OF BARS VARIES WITH SKEW.

|                                                                                                                                                                                                                                               |                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                   |
| <p><b>CONCRETE TRIPLE BOX CULVERT</b></p> <p>SKEW: RIGHT ADVANCE<br/>WINGS: STRAIGHT</p> <p><b>REINFORCEMENT</b></p>                                                                                                                          |                                                                   |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                             | <p>DATE EFFECTIVE: 12/01/2011</p> <p>DATE PREPARED: 5/13/2015</p> |
| <p><b>703.84H</b></p>                                                                                                                                                                                                                         | <p>SHEET NO.<br/><b>2 OF 3</b></p>                                |

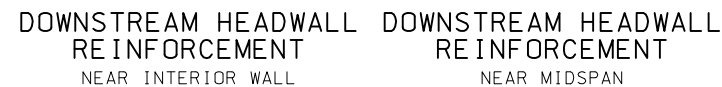


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FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



IF D2 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF C WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



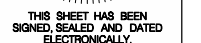
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DRAWING NOT TO SCALE. FOLLOW  
DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING  
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MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

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CONCRETE  
TRIPLE BOX CULVERT

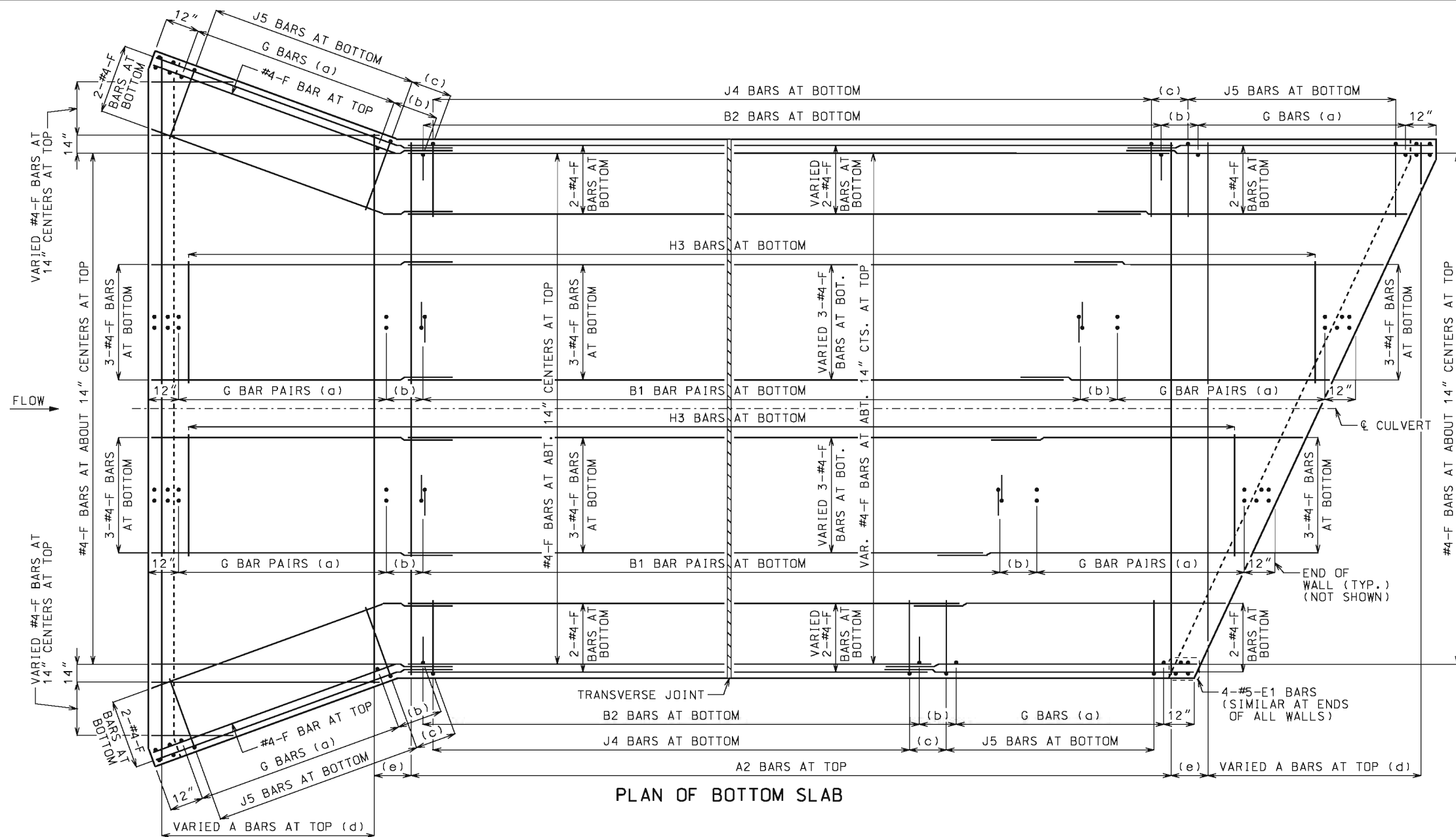
SKEW: RIGHT ADVANCE  
WINGS: STRAIGHT

## SECTIONS

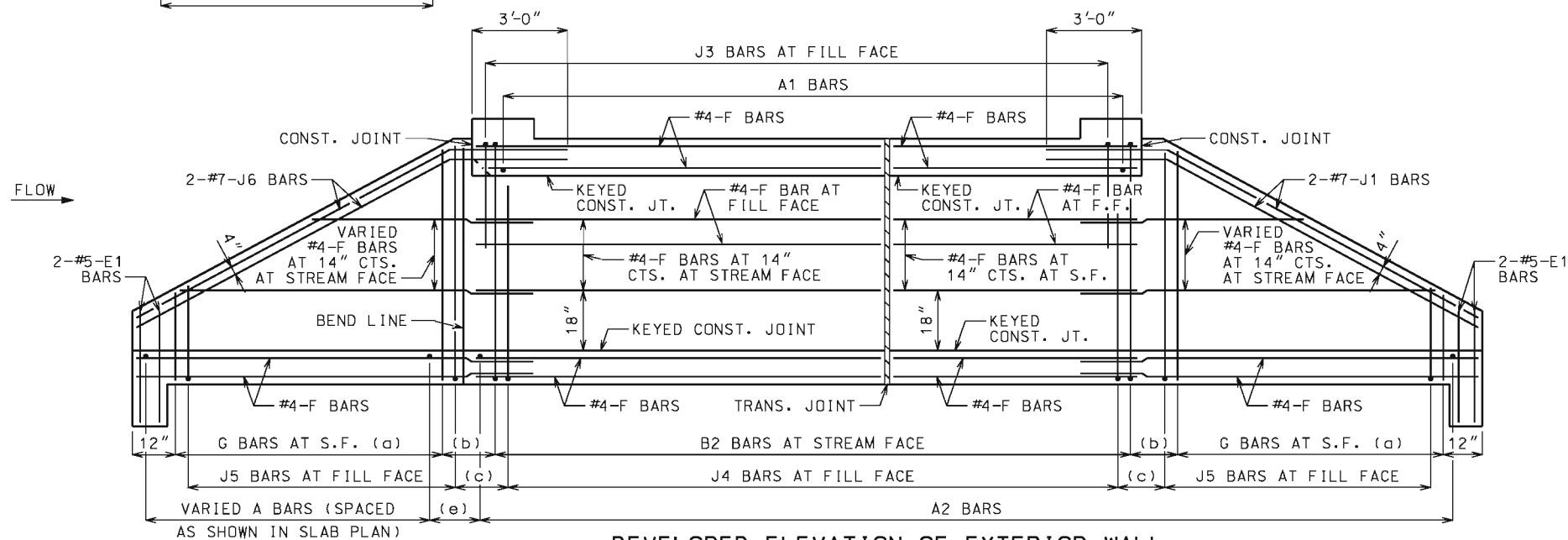
DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

703.84H

SHEET NO.  
3 OF 3



PLAN OF BOTTOM SLAB



DEVELOPED ELEVATION OF EXTERIOR WALL

J1 BARS MAY BE BENT IN FIELD OR SHOP.

## LAYING OUT TRANVERSE JOINTS

UNLESS SHOWN ON BRIDGE PLANS

USE A TRANSVERSE JOINT WHEN BARREL LENGTH IS OVER 80 FEET.  
USE ADDITIONAL JOINTS TO LIMIT CUT SECTION LENGTH AND END SECTION BARREL LENGTH MEASURED ALONG CENTERLINE OF CULVERT TO 50 FEET.

MINIMUM END SECTION LENGTH SHALL BE 3 FEET MEASURED ALONG THE SHORTEST WALL FROM THE INSIDE FACE OF HEADWALL TO THE TRANSVERSE JOINT.

TO AVOID LOCATING TRANSVERSE JOINTS UNDER A TRAVELED WAY WITH DESIGN FILLS 2 FEET OR LESS THE FOLLOWING SHALL APPLY:

BARREL LENGTH UP TO 90 FEET WITHOUT A TRANSVERSE JOINT

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FOR CUT SECTION DETAILS, SEE 703.86.

## GENERAL NOTES:

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(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) J4 BAR SPACING

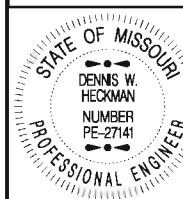
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JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
TRIPLE BOX CULVERT

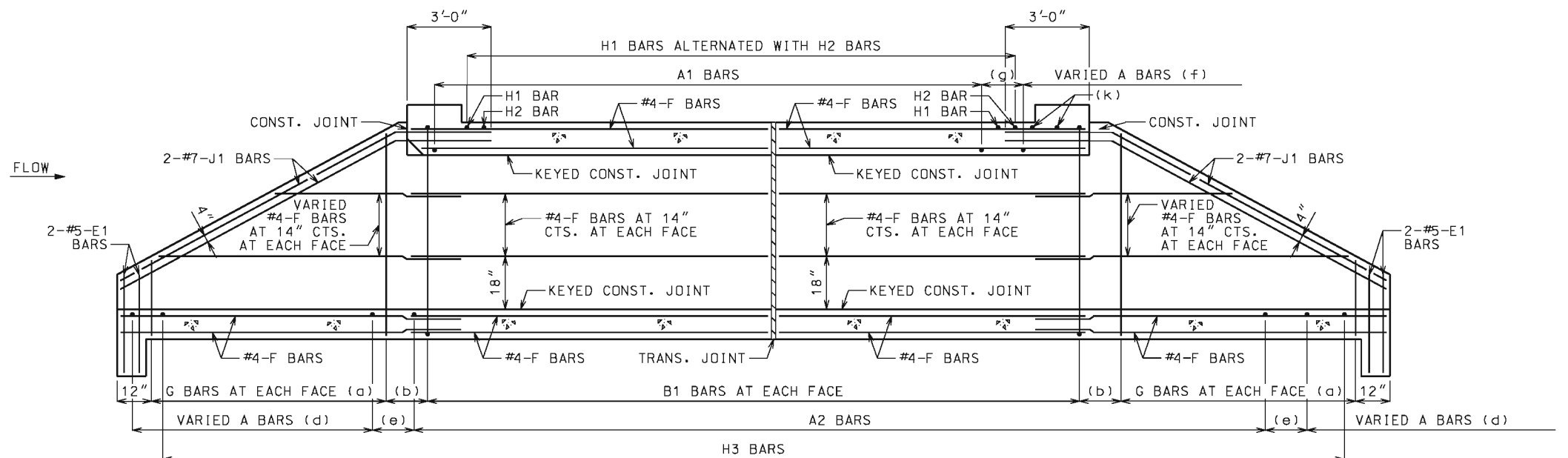
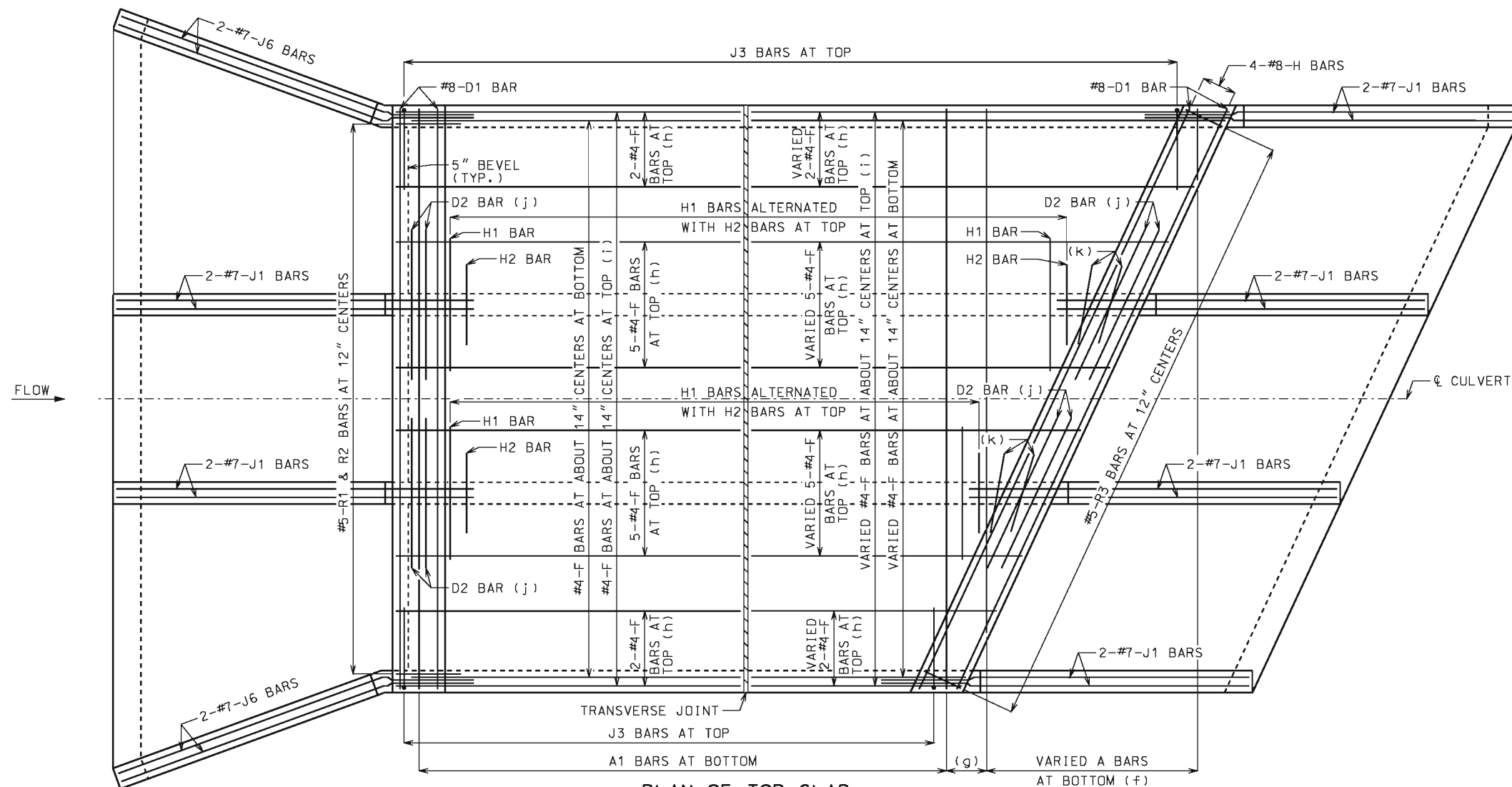
SKEW: RIGHT ADVANCE  
WINGS: FLARED

REINFORCEMENT

DATE EFFECTIVE: 12/01/2011  
DATE PREPARED: 5/13/2015

703.85C

SHEET NO.  
1 OF 3



### GENERAL NOTES:

FOR SECTIONS THRU BARREL, WINGS AND HEADWALLS, SEE SHEET 3 OF 3. FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN PLAN AND SECTION, SEE SHEET 3 OF 3 FOR DETAILS.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".

LAP LONGITUDINAL BARS A MINIMUM OF 23" AT SPLICES.

BEVELED HEADWALL SHALL BE LOCATED AT UPSTREAM END.

(a) SAME SIZE AND SPACING AS ADJACENT B BARS

(b) VARIES, 12" MAXIMUM

(c) NOT SPECIFIED ON THIS SHEET

(d) SAME SIZE AND SPACING AS A2 BARS

(e) A2 BAR SPACING

(f) SAME SIZE AND SPACING AS A1 BARS

(g) A1 BAR SPACING

(h) FOR DESIGN FILLS OVER 2'-0"

(i) FOR DESIGN FILLS 2'-0" OR LESS

(j) NOT REQUIRED FOR CLEAR SPANS  $\leq 10'-0"$

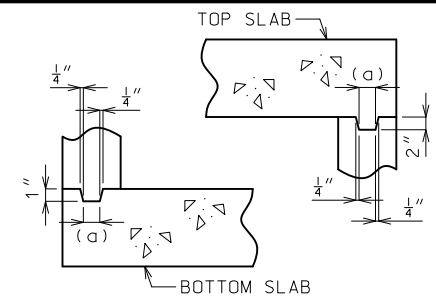
#8 FOR CLEAR SPAN  $> 10'-0"$

#9 FOR CLEAR SPAN  $> 13'-0"$

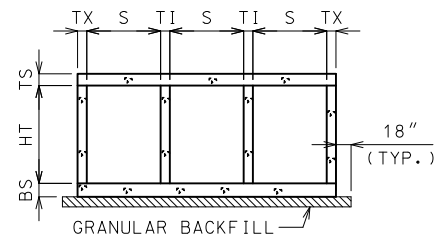
IF REQUIRED, THE MINIMUM LENGTH EACH SIDE OF  $\phi$  WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.

(k) H2 BARS AS REQUIRED, QUANTITY OF BARS VARIES WITH SKEW.

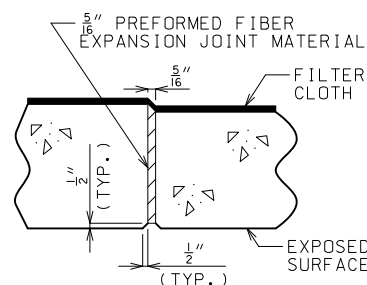
|                                                                                                                                                                                                                                  |                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                        |
|                                                                                                                                             | <b>CONCRETE<br/>TRIPLE BOX CULVERT</b><br>SKEW: RIGHT ADVANCE<br>WINGS: FLARED<br><b>REINFORCEMENT</b> |
| DATE EFFECTIVE: 12/01/2011<br>DATE PREPARED: 5/13/2015                                                                                                                                                                           | <b>703.85C</b>                                                                                         |
| SHEET NO.<br><b>2 OF 3</b>                                                                                                                                                                                                       |                                                                                                        |



**KEYED CONSTRUCTION JOINT**  
(a) APPROXIMATELY ONE-THIRD OF WALL THICKNESS



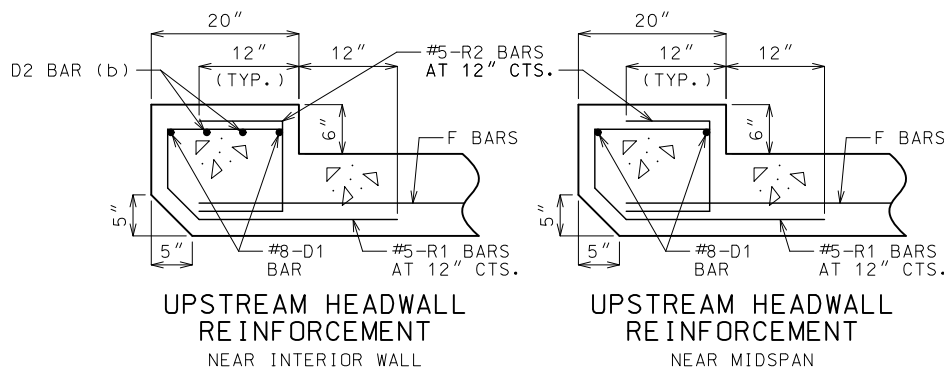
**GRANULAR BACKFILL LIMITS AND MEMBER DIMENSIONS**



**TRANSVERSE JOINT THRU BARREL**

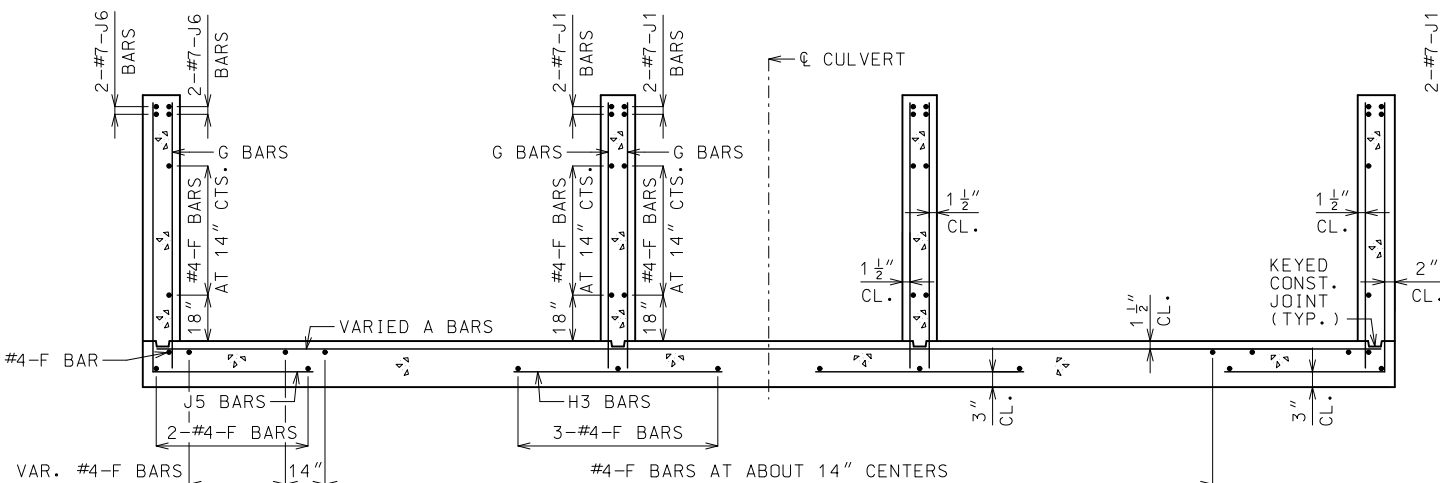
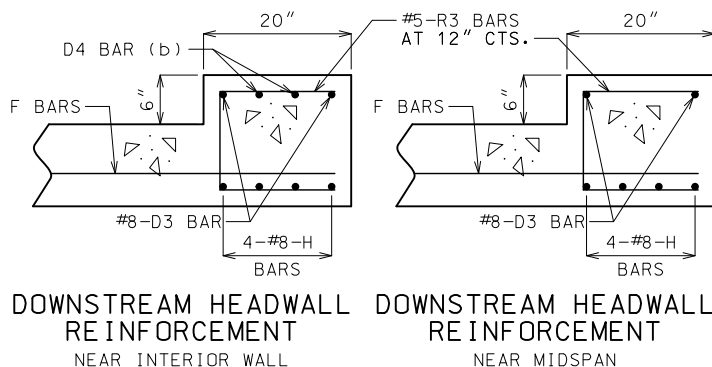
PREFORMED FIBER EXPANSION JOINT MATERIAL IN ACCORDANCE WITH SEC 1057 SHALL BE SECURELY STITCHED TO ONE FACE OF THE CONCRETE WITH 10 GAGE COPPER WIRE OR 12 GAGE SOFT DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.

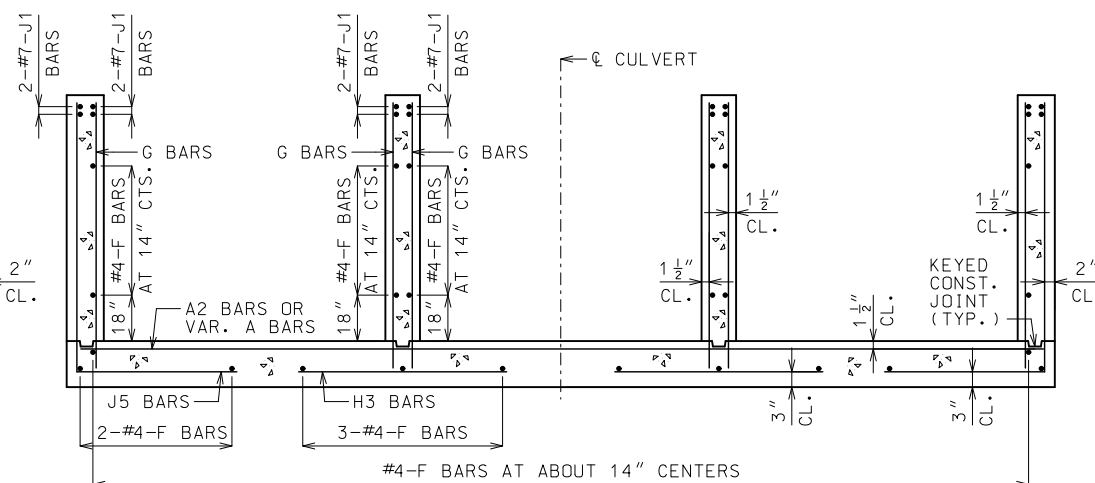


(b) NOT REQUIRED FOR CLEAR SPANS  $\leq 10'-0"$   
#8 FOR CLEAR SPAN  $> 10'-0"$   
#9 FOR CLEAR SPAN  $> 13'-0"$

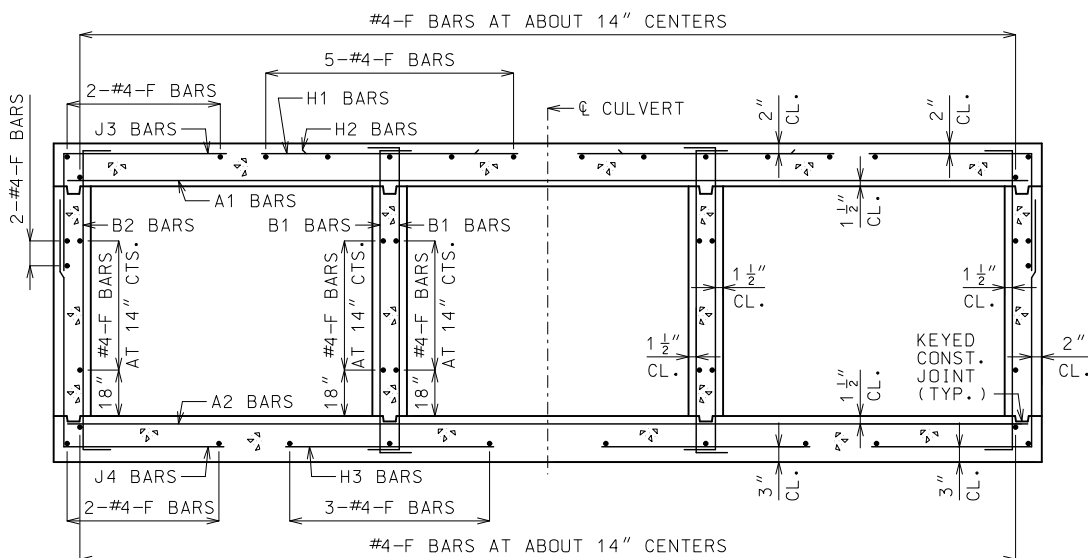
IF D2 AND D4 BARS ARE REQUIRED, THE MINIMUM LENGTH EACH SIDE OF  $\phi$  WALL SHALL BE THE GREATER OF 48 BAR DIAMETERS OR  $\frac{1}{4}$  CLEAR SPAN. THE CLEAR SPAN IS PARALLEL TO LONG DIRECTION OF HEADWALL.



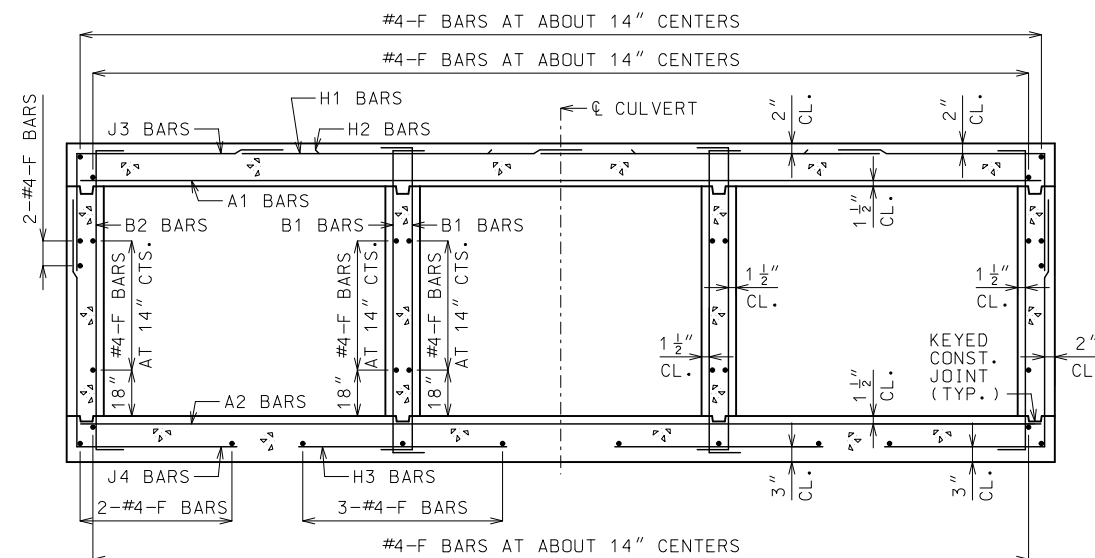
**UPSTREAM FLARED WINGS REINFORCEMENT**



**DOWNSTREAM WINGS REINFORCEMENT**



**BARREL REINFORCEMENT**  
FOR DESIGN FILLS OVER 2'-0"



**BARREL REINFORCEMENT**  
FOR DESIGN FILLS 2'-0" OR LESS

**GENERAL NOTES:**

FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND DIMENSIONS OF ALL REINFORCEMENT EXCEPT J5 BARS, SEE 703.87. FOR J5 BARS, SEE 703.37.

BARREL AND WINGS SECTIONS ARE SYMMETRICAL ABOUT AND NORMAL TO  $\phi$  CULVERT. HEADWALL SECTIONS ARE NORMAL TO LONG DIRECTION OF HEADWALL.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}"$ .

|                                                                                                                                            |                                                                                            |                |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------|
| <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                            |                |
|                                                                                                                                            | <b>CONCRETE TRIPLE BOX CULVERT</b><br>SKEW: RIGHT ADVANCE<br>WINGS: FLARED<br><br>SECTIONS |                |
|                                                                                                                                            | DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                    | <b>703.85C</b> |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



PREFORMED FIBER EXPANSION JOINT  
MATERIAL IN ACCORDANCE WITH SEC  
1057 SHALL BE SECURELY STITCHED TO  
ONE FACE OF THE CONCRETE WITH 10  
GAGE COPPER WIRE OR 12 GAGE SOFT  
DRAWN GALVANIZED STEEL WIRE.

FILTER CLOTH 3 FEET IN WIDTH AND DOUBLE THICKNESS SHALL BE CENTERED ON TRANSVERSE JOINTS IN TOP SLAB AND SIDEWALLS WITH EDGES SEALED WITH MASTIC OR TWO SIDED TAPE. FILTER CLOTH SHALL BE A SEPARATION GEOTEXTILE IN ACCORDANCE WITH SEC 1011. COST OF FURNISHING AND INSTALLING FILTER CLOTH WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.



## GENERAL NOTES

DESIGN SPECIFICATIONS:  
2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND 2010 INTERIM REVISIONS

DESIGN LOADING:  
VEHICULAR = HL-93 MINUS LANE LOAD, EARTH = 120 LB/CF  
EQUIVALENT FLUID PRESSURE = 30 LB/CF (MIN.), 60 LB/CF (MAX.)

DESIGN UNIT STRESSES:  
CLASS B-1 CONCRETE (BOX CULVERT)  $f'_c = 4,000$  PSI  
REINFORCING STEEL (GRADE 60)  $f_y = 60,000$  PSI

MISCELLANEOUS:  
FOR MEMBER THICKNESS AND FOR BAR SIZES, SPACING AND  
DIMENSIONS, SEE 703.87.

CONSTRUCTION JOINT KEY NOT SHOWN FOR CLARITY IN  
PART PLANS, PART ELEVATION AND PART SECTION.

DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE  $1\frac{1}{2}$ ".



FOR DESIGN FILLS OVER 2'-0"  
SYMMETRICAL ABOUT AND NORMAL TO C CULVERT.



FOR DESIGN FILLS 2'-0" OR LESS  
SYMMETRICAL ABOUT AND NORMAL TO C CULVERT.

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

CONCRETE  
TRIPLE BOX CULVERT

CUT SECTION

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

703.86

SHEET NO.  
1 OF 1

| SPAN (S) = 3 FT |                  |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         |      |         | HEIGHT (HT) = 2 FT OR 3 FT OR 4 FT |           |      |      |      |    |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------|---------|------------------------------------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |      |         |                                    | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |      | B2 BARS |                                    |           |      |      |      |    |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA. | C7      | Q10                                | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=2' | HT=3'   | HT=4' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=2' | HT=3' | HT=4' |         |      |         |                                    |           |      |      |      |    |  |  |  |  |  |  |  |  |  |
| 1 FT            | 10               | 8  | 8  | 8  | 4             | 8.5  | 4       | 10.5 | 26.8 | 26.0  | 26.0    | 26.0  | 4    | 24   | 39.5    | 30.5 | 4    | 24   | 20.0    | 20.0 | 4                | 12   | 4    | 12   | 36.0    | 28    | 40    | 52    | 4       | 12   | 25.0    | 25.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |
| 2 FT            | 10               | 8  | 8  | 8  | 4             | 8.5  | 4       | 10.5 | 26.8 | 26.0  | 26.0    | 26.0  | 4    | 24   | 39.5    | 30.5 | 4    | 24   | 20.0    | 20.0 | 4                | 12   | 4    | 12   | 35.0    | 28    | 40    | 52    | 4       | 12   | 24.0    | 24.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 10               | 8  | 8  | 8  | 4             | 8.5  | 4       | 10.5 | 26.8 | 26.0  | 26.0    | 26.0  | 4    | 24   | 39.5    | 34.0 | 4    | 24   | 20.0    | 20.0 | 4                | 12   | 4    | 12   | 35.0    | 28    | 40    | 52    | 4       | 12   | 24.0    | 24.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 26.8 | 24.0  | 24.0    | 24.0  | 4    | 24   | 39.5    | 34.0 | 4    | 24   | 19.0    | 19.0 | 4                | 12   | 4    | 12   | 31.1    | 28    | 40    | 52    | 4       | 12   | 23.0    | 24.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 31.1 | 24.0  | 24.0    | 24.0  | 4    | 24   | 26.0    | 26.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 28.9    | 28    | 40    | 52    | 4       | 12   | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 28.5 | 24.0  | 24.0    | 24.0  | 4    | 24   | 24.0    | 24.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 27.3    | 28    | 40    | 52    | 4       | 12   | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 27.1 | 24.0  | 24.0    | 24.0  | 4    | 24   | 23.0    | 24.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 26.5    | 28    | 40    | 52    | 4       | 12   | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 25.0 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 23.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 24.5    | 28    | 40    | 52    | 4       | 12   | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.9 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 23.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 24.5    | 28    | 40    | 52    | 4       | 12   | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.8 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 24.4    | 28    | 40    | 52    | 4       | 11.5 | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.8 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 24.4    | 28    | 40    | 52    | 4       | 11   | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.6 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 24.3    | 28    | 40    | 52    | 4       | 10.5 | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.6 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 12   | 4    | 12   | 24.3    | 28    | 40    | 52    | 4       | 9.5  | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 11.5 | 4    | 12   | 24.3    | 28    | 40    | 52    | 4       | 9    | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 10.5 | 4    | 11   | 24.1    | 28    | 40    | 52    | 4       | 9    | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 11   | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 10   | 4    | 10   | 24.1    | 28    | 40    | 52    | 4       | 8.5  | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 8                | 8  | 8  | 8  | 4             | 11   | 4       | 10.5 | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 24   | 21.0    | 22.0 | 4    | 24   | 18.0    | 18.0 | 4                | 9    | 4    | 9.5  | 24.1    | 28    | 40    | 52    | 4       | 8    | 22.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 8                | 9  | 8  | 8  | 4             | 10.5 | 4       | 9.5  | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 23   | 21.0    | 22.0 | 4    | 23   | 18.0    | 18.0 | 4                | 9.5  | 4    | 12   | 24.5    | 29    | 41    | 53    | 4       | 9.5  | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 8                | 9  | 8  | 8  | 4             | 10   | 4       | 9    | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 22   | 21.0    | 22.0 | 4    | 22   | 18.0    | 18.0 | 4                | 9    | 4    | 11   | 24.4    | 29    | 41    | 53    | 4       | 9    | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 8                | 9  | 8  | 8  | 4             | 9.5  | 4       | 8.5  | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 21   | 21.0    | 22.0 | 4    | 21   | 18.0    | 18.0 | 4                | 8.5  | 4    | 10.5 | 24.4    | 29    | 41    | 53    | 4       | 8.5  | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 8                | 9  | 8  | 8  | 4             | 9    | 4       | 8    | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 20   | 21.0    | 22.0 | 4    | 20   | 18.0    | 18.0 | 4                | 8    | 4    | 10   | 24.4    | 29    | 41    | 53    | 4       | 8.5  | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 8                | 10 | 8  | 8  | 4             | 8.5  | 4       | 7.5  | 24.5 | 24.0  | 24.0    | 24.0  | 4    | 19   | 21.0    | 22.0 | 4    | 19   | 18.0    | 18.0 | 4                | 8.5  | 4    | 12   | 24.8    | 30    | 42    | 54    | 4       | 9    | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 9                | 10 | 8  | 8  | 4             | 9    | 4       | 9    | 24.8 | 25.0  | 25.0    | 25.0  | 4    | 21   | 21.0    | 23.0 | 4    | 21   | 17.0    | 18.0 | 4                | 8    | 4    | 11.5 | 24.8    | 30    | 42    | 54    | 4       | 9    | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 9                | 10 | 8  | 8  | 4             | 8.5  | 4       | 8.5  | 24.8 | 25.0  | 25.0    | 25.0  | 4    | 20   | 21.0    | 23.0 | 4    | 20   | 17.0    | 18.0 | 4                | 8    | 4    | 11   | 24.8    | 30    | 42    | 54    | 4       | 9    | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 9                | 10 | 8  | 8  | 4             | 8    | 4       | 8    | 24.8 | 25.0  | 25.0    | 25.0  | 4    | 19   | 21.0    | 23.0 | 4    | 19   | 17.0    | 18.0 | 4                | 7.5  | 4    | 10.5 | 24.8    | 30    | 42    | 54    | 4       | 8.5  | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 9                | 11 | 8  | 8  | 4             | 8    | 4       | 7.5  | 24.9 | 25.0  | 25.0    | 25.0  | 4    | 19   | 21.0    | 22.0 | 4    | 19   | 18.0    | 18.0 | 4                | 8    | 4    | 10.5 | 25.0    | 31    | 43    | 55    | 4       | 9.5  | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 10               | 11 | 8  | 8  | 4             | 8    | 4       | 8    | 25.1 | 26.0  | 26.0    | 26.0  | 4    | 20   | 21.0    | 23.0 | 4    | 20   | 17.0    | 18.0 | 4                | 7.5  | 4    | 10.5 | 25.1    | 31    | 43    | 55    | 4       | 9    | 21.0    | 23.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 3 FT |                     |      |      |      |               |       |         |      |      |      |         |      |      |      |         |      |                  |      |         |    |         |       |      |      |         |     |           |      |         | HEIGHT (HT) = 5 FT OR 6 FT |         |    |   |      |    |  |  |  |  |  |  |
|-----------------|---------------------|------|------|------|---------------|-------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|---------|----|---------|-------|------|------|---------|-----|-----------|------|---------|----------------------------|---------|----|---|------|----|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |       |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |         |    |         |       |      |      |         |     | WALL BARS |      |         |                            |         |    |   |      |    |  |  |  |  |  |  |
|                 |                     |      |      |      | A1 BARS       |       | J3 BARS |      |      |      | H1 BARS |      |      |      | H2 BARS |      |                  |      | A2 BARS |    | J4 BARS |       |      |      | H3 BARS |     |           |      | B1 BARS |                            | B2 BARS |    |   |      |    |  |  |  |  |  |  |
|                 | SIZE                | SPA. | SIZE | SPA. | C1            | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA.    | C4 | K3      |       | SIZE | SPA. | C7      | Q10 | SIZE      | SPA. | SIZE    | SPA.                       | G1      |    |   |      |    |  |  |  |  |  |  |
|                 |                     |      |      |      |               | HT=5' | HT=6'   |      |      |      |         |      |      |      |         |      |                  |      |         |    | HT=5'   | HT=6' |      |      |         |     |           |      |         |                            |         |    |   |      |    |  |  |  |  |  |  |
| 1 FT            | 10                  | 8    | 8    | 8    | 4             | 8.5   | 4       | 10.5 | 26.8 | 26.0 | 26.0    | 4    | 24   | 39.5 | 30.5    | 4    | 24               | 21.0 | 20.0    | 4  | 12      | 4     | 11.5 | 36.0 | 64      | 76  | 4         | 12   | 34.0    | 25.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 2 FT            | 10                  | 8    | 8    | 8    | 4             | 8.5   | 4       | 10.5 | 26.8 | 26.0 | 26.0    | 4    | 24   | 39.5 | 30.5    | 4    | 24               | 20.0 | 20.0    | 4  | 12      | 4     | 11   | 36.0 | 64      | 76  | 4         | 12   | 34.0    | 24.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 2'- 4'          | 10                  | 8    | 8    | 8    | 4             | 8.5   | 4       | 10.5 | 26.8 | 26.0 | 26.0    | 4    | 24   | 39.5 | 34.0    | 4    | 24               | 20.0 | 20.0    | 4  | 12      | 4     | 10   | 36.0 | 64      | 76  | 4         | 12   | 34.0    | 24.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 4 FT            | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 26.8 | 24.0 | 24.0    | 4    | 24   | 39.5 | 34.0    | 4    | 24               | 19.0 | 19.0    | 4  | 12      | 4     | 10   | 36.0 | 64      | 76  | 4         | 12   | 34.0    | 24.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 6 FT            | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 26.8 | 24.0 | 24.0    | 4    | 24   | 39.5 | 26.0    | 4    | 24               | 18.0 | 19.0    | 4  | 12      | 4     | 9.5  | 36.0 | 64      | 76  | 4         | 12   | 34.0    | 23.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 8 FT            | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 26.8 | 24.0 | 24.0    | 4    | 24   | 39.5 | 24.0    | 4    | 24               | 18.0 | 18.0    | 4  | 12      | 4     | 9    | 36.0 | 64      | 76  | 4         | 12   | 24.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 26.8 | 24.0 | 24.0    | 4    | 24   | 39.5 | 23.0    | 4    | 24               | 18.0 | 18.0    | 4  | 12      | 4     | 8.5  | 36.0 | 64      | 76  | 4         | 12   | 23.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 34.9 | 24.0 | 24.0    | 4    | 24   | 22.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 12      | 4     | 9    | 34.4 | 64      | 76  | 4         | 12   | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 11   | 34.5 | 24.0 | 24.0    | 4    | 24   | 22.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 12      | 4     | 8.5  | 34.1 | 64      | 76  | 4         | 12   | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 16 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 10   | 34.3 | 24.0 | 24.0    | 4    | 24   | 22.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 12      | 4     | 8    | 33.9 | 64      | 76  | 4         | 12   | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 18 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 9    | 34.0 | 24.0 | 24.0    | 4    | 24   | 22.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 12      | 4     | 7.5  | 33.8 | 64      | 76  | 4         | 12   | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 20 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 8    | 33.8 | 24.0 | 24.0    | 4    | 24   | 22.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 12      | 4     | 7    | 33.6 | 64      | 76  | 4         | 11.5 | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 22 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 7.5  | 33.6 | 24.0 | 24.0    | 4    | 24   | 22.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 12      | 4     | 6.5  | 33.5 | 64      | 76  | 4         | 10.5 | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 24 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 7    | 33.5 | 24.0 | 24.0    | 4    | 24   | 22.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 11.5    | 4     | 6    | 33.4 | 64      | 76  | 4         | 10.5 | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 26 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 6.5  | 33.4 | 24.0 | 24.0    | 4    | 24   | 21.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 10.5    | 5     | 6.5  | 33.3 | 64      | 76  | 4         | 10   | 22.0    | 22.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 28 FT           | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 6    | 33.3 | 24.0 | 24.0    | 4    | 24   | 21.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 10      | 5     | 6    | 33.1 | 64      | 76  | 4         | 9.5  | 22.0    | 22.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 30 FT           | 8                   | 8    | 9    | 8    | 4             | 11.5  | 4       | 6.5  | 32.3 | 24.0 | 24.0    | 4    | 24   | 21.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 9.5     | 4     | 6    | 32.1 | 64      | 76  | 4         | 9    | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 32 FT           | 8                   | 9    | 9    | 8    | 4             | 11    | 4       | 6.5  | 32.1 | 24.0 | 24.0    | 4    | 24   | 21.0 | 22.0    | 4    | 24               | 17.0 | 18.0    | 4  | 10      | 4     | 6.5  | 34.1 | 65      | 77  | 4         | 10.5 | 22.0    | 23.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 34 FT           | 8                   | 9    | 9    | 8    | 4             | 10    | 4       | 6    | 32.0 | 24.0 | 24.0    | 4    | 23   | 21.0 | 22.0    | 4    | 23               | 17.0 | 18.0    | 4  | 9.5     | 4     | 6    | 34.0 | 65      | 77  | 4         | 10   | 22.0    | 23.0                       | 5       | 12 | 5 | 11.5 | 0  |  |  |  |  |  |  |
| 36 FT           | 8                   | 9    | 9    | 8    | 4             | 9.5   | 5       | 7    | 32.0 | 24.0 | 24.0    | 4    | 22   | 21.0 | 22.0    | 4    | 22               | 17.0 | 18.0    | 4  | 9       | 4     | 6    | 34.0 | 65      | 77  | 4         | 10   | 22.0    | 23.0                       | 5       | 12 | 5 | 11   | 0  |  |  |  |  |  |  |
| 38 FT           | 8                   | 9    | 9    | 8    | 4             | 9     | 5       | 6.5  | 32.0 | 24.0 | 28.0    | 4    | 21   | 21.0 | 22.0    | 4    | 21               | 17.0 | 18.0    | 4  | 8.5     | 5     | 7    | 34.0 | 65      | 77  | 4         | 9.5  | 22.0    | 23.0                       | 5       | 12 | 5 | 10   | 0  |  |  |  |  |  |  |
| 40 FT           | 8                   | 10   | 9    | 8    | 4             | 8.5   | 5       | 6    | 31.9 | 24.0 | 24.0    | 4    | 20   | 21.0 | 22.0    | 4    | 20               | 17.0 | 18.0    | 4  | 9       | 4     | 6    | 35.5 | 66      | 78  | 4         | 10.5 | 23.0    | 23.0                       | 5       | 12 | 5 | 10   | 0  |  |  |  |  |  |  |
| 42 FT           | 9                   | 10   | 9    | 8    | 4             | 9.5   | 5       | 6.5  | 33.4 | 25.0 | 29.0    | 4    | 22   | 21.0 | 22.0    | 4    | 22               | 17.0 | 18.0    | 4  | 9       | 5     | 7    | 35.3 | 66      | 78  | 4         | 10   | 23.0    | 23.0                       | 5       | 12 | 5 | 9.5  | 0  |  |  |  |  |  |  |
| 44 FT           | 9                   | 10   | 9    | 8    | 4             | 9     | 5       | 6.5  | 33.3 | 25.0 | 29.0    | 4    | 21   | 21.0 | 22.0    | 4    | 21               | 17.0 | 18.0    | 4  | 8.5     | 5     | 6.5  | 35.3 | 66      | 78  | 4         | 10   | 23.0    | 23.0                       | 5       | 12 | 5 | 9    | 0  |  |  |  |  |  |  |
| 46 FT           | 9                   | 10   | 9    | 8    | 4             | 8.5   | 5       | 6    | 33.3 | 25.0 | 29.0    | 4    | 21   | 21.0 | 22.0    | 4    | 21               | 17.0 | 18.0    | 4  | 8       | 5     | 6.5  | 35.1 | 66      | 78  | 4         | 9.5  | 23.0    | 23.0                       | 5       | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |
| 48 FT           | 9                   | 11   | 9    | 8    | 4             | 8     | 5       | 6    | 33.1 | 25.0 | 29.0    | 4    | 20   | 21.0 | 22.0    | 4    | 20               | 17.0 | 18.0    | 4  | 8.5     | 5     | 6.5  | 36.4 | 67      | 79  | 4         | 10   | 23.0    | 23.0                       | 5       | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |
| 50 FT           | 9                   | 11   | 9    | 8    | 4             | 7.5   | 5       | 6    | 33.1 | 25.0 | 29.0    | 4    | 19   | 21.0 | 22.0    | 4    | 19               | 17.0 | 18.0    | 4  | 8.5     | 5     | 6.5  | 36.4 | 67      | 79  | 4         | 10   | 23.0    | 23.0                       | 5       | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |

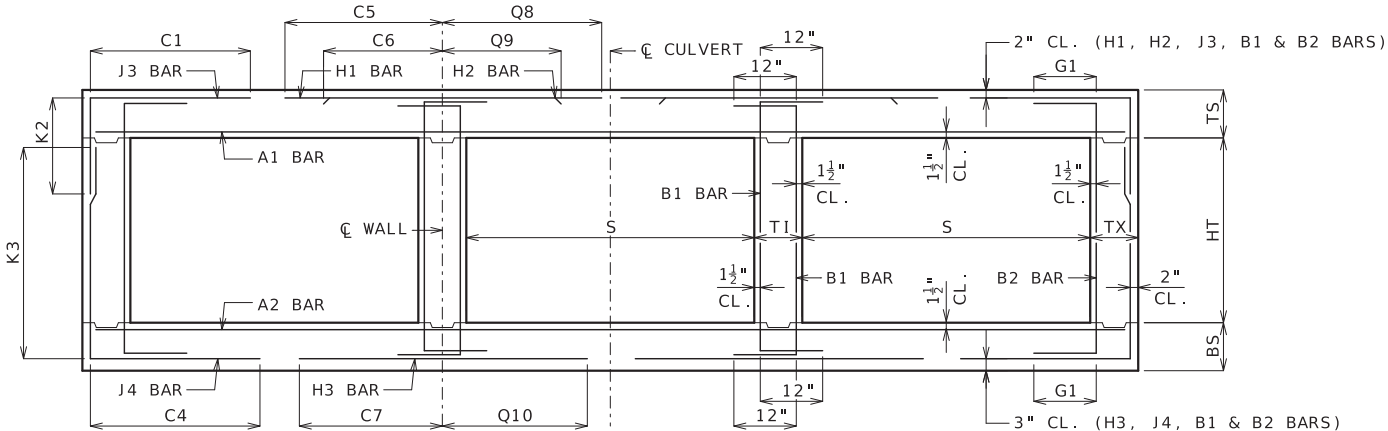


| SPAN (S) = 4 FT |                  |    |    |    |               |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |      |      |         |      |           | HEIGHT (HT) = 2 FT OR 3 FT |      |      |    |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|------|------|---------|------|-----------|----------------------------|------|------|----|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |      |      |         |      | WALL BARS |                            |      |      |    |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |      |      | B1 BARS |      | B2 BARS   |                            |      |      |    |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |       | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                       | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=2' | HT=3'   |      |      |      |         |      |      |      |         |      |                  |      |      |      | HT=2'   | HT=3' |      |      |         |      |           |                            |      |      |    |  |  |  |  |  |  |  |  |
| 1 FT            | 10               | 8  | 8  | 8  | 4             | 7    | 4       | 10.5 | 30.3 | 26.0  | 26.0    | 4    | 24   | 47.5 | 36.5    | 4    | 24   | 21.0 | 20.0    | 4    | 12               | 4    | 12   | 29.4 | 28      | 40    | 4    | 12   | 27.0    | 28.0 | 5         | 12                         | 5    | 12   | 2  |  |  |  |  |  |  |  |  |
| 2 FT            | 10               | 8  | 8  | 8  | 4             | 7    | 4       | 10.5 | 30.3 | 26.0  | 26.0    | 4    | 24   | 47.5 | 36.5    | 4    | 24   | 21.0 | 20.0    | 4    | 12               | 4    | 12   | 27.3 | 28      | 40    | 4    | 11.5 | 27.0    | 27.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 2' - 4'         | 10               | 8  | 8  | 8  | 4             | 7    | 4       | 10.5 | 30.3 | 26.0  | 26.0    | 4    | 24   | 47.5 | 36.5    | 4    | 24   | 21.0 | 20.0    | 4    | 12               | 4    | 12   | 27.3 | 28      | 40    | 4    | 11.5 | 27.0    | 27.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 28.6 | 24.0  | 24.0    | 4    | 24   | 33.0 | 36.0    | 4    | 24   | 20.0 | 20.0    | 4    | 12               | 4    | 12   | 25.0 | 28      | 40    | 4    | 11.5 | 26.0    | 27.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 26.0 | 24.0  | 24.0    | 4    | 24   | 28.0 | 29.0    | 4    | 24   | 19.0 | 19.0    | 4    | 12               | 4    | 12   | 24.1 | 28      | 40    | 4    | 10.5 | 25.0    | 26.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.8 | 24.0  | 24.0    | 4    | 24   | 26.0 | 28.0    | 4    | 24   | 19.0 | 19.0    | 4    | 12               | 4    | 12   | 23.5 | 28      | 40    | 4    | 10   | 25.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 24.1 | 24.0  | 24.0    | 4    | 24   | 26.0 | 27.0    | 4    | 24   | 19.0 | 19.0    | 4    | 12               | 4    | 12   | 23.1 | 28      | 40    | 4    | 9    | 25.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 23.6 | 24.0  | 24.0    | 4    | 23   | 25.0 | 26.0    | 4    | 23   | 18.0 | 19.0    | 4    | 12               | 4    | 12   | 22.9 | 28      | 40    | 4    | 8    | 25.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 23.4 | 24.0  | 24.0    | 4    | 22   | 25.0 | 26.0    | 4    | 22   | 18.0 | 18.0    | 4    | 11               | 4    | 12   | 22.6 | 28      | 40    | 4    | 7.5  | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 22.5 | 24.0  | 24.0    | 4    | 21   | 24.0 | 25.0    | 4    | 21   | 18.0 | 18.0    | 4    | 10.5             | 4    | 12   | 22.1 | 28      | 40    | 4    | 7.5  | 24.0    | 25.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                | 8  | 8  | 8  | 4             | 11.5 | 4       | 12   | 22.5 | 24.0  | 24.0    | 4    | 20   | 24.0 | 25.0    | 4    | 20   | 18.0 | 18.0    | 4    | 9.5              | 4    | 10.5 | 22.1 | 28      | 40    | 4    | 7    | 24.0    | 25.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                | 8  | 8  | 8  | 4             | 10.5 | 4       | 11   | 22.4 | 24.0  | 24.0    | 4    | 18   | 24.0 | 25.0    | 4    | 18   | 18.0 | 18.0    | 4    | 8.5              | 4    | 9.5  | 22.1 | 28      | 40    | 4    | 6.5  | 24.0    | 25.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                | 8  | 8  | 8  | 4             | 9.5  | 4       | 10   | 22.4 | 24.0  | 24.0    | 4    | 17   | 24.0 | 25.0    | 4    | 17   | 18.0 | 18.0    | 4    | 7.5              | 4    | 9    | 22.0 | 28      | 40    | 4    | 6    | 24.0    | 25.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 24 FT           | 8                | 9  | 8  | 8  | 4             | 8.5  | 4       | 9    | 22.6 | 24.0  | 24.0    | 4    | 15   | 24.0 | 25.0    | 4    | 15   | 18.0 | 18.0    | 4    | 8                | 4    | 11.5 | 21.4 | 29      | 41    | 4    | 7    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 26 FT           | 8                | 9  | 8  | 8  | 4             | 8    | 4       | 8.5  | 22.5 | 24.0  | 24.0    | 4    | 14   | 24.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4    | 7                | 4    | 11   | 21.4 | 29      | 41    | 4    | 6.5  | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 28 FT           | 8                | 10 | 8  | 8  | 4             | 7.5  | 4       | 8    | 22.8 | 24.0  | 24.0    | 4    | 13   | 24.0 | 25.0    | 4    | 13   | 18.0 | 18.0    | 4    | 7.5              | 4    | 12   | 20.9 | 30      | 42    | 4    | 7    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 30 FT           | 9                | 10 | 8  | 8  | 4             | 7.5  | 4       | 10   | 22.1 | 25.0  | 25.0    | 4    | 15   | 24.0 | 26.0    | 4    | 15   | 18.0 | 18.0    | 4    | 7                | 4    | 12   | 21.0 | 30      | 42    | 4    | 7    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 32 FT           | 9                | 10 | 8  | 8  | 4             | 7    | 4       | 9.5  | 22.1 | 25.0  | 25.0    | 4    | 14   | 24.0 | 26.0    | 4    | 14   | 18.0 | 18.0    | 4    | 6                | 4    | 12   | 21.0 | 30      | 42    | 4    | 6    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 34 FT           | 9                | 11 | 8  | 8  | 4             | 6.5  | 4       | 9    | 22.3 | 25.0  | 25.0    | 4    | 13   | 24.0 | 26.0    | 4    | 13   | 18.0 | 18.0    | 4    | 6.5              | 4    | 10.5 | 20.6 | 31      | 43    | 4    | 7    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 36 FT           | 10               | 11 | 8  | 8  | 4             | 7    | 4       | 10   | 21.9 | 26.0  | 26.0    | 4    | 14   | 24.0 | 26.0    | 4    | 14   | 18.0 | 19.0    | 4    | 6.5              | 4    | 10.5 | 20.9 | 31      | 43    | 4    | 7    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 38 FT           | 10               | 12 | 8  | 8  | 4             | 6.5  | 4       | 9.5  | 22.0 | 26.0  | 26.0    | 4    | 13   | 24.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 4    | 6.5              | 4    | 9.5  | 20.5 | 32      | 44    | 4    | 7.5  | 24.0    | 27.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 40 FT           | 10               | 12 | 8  | 8  | 4             | 6    | 4       | 9    | 22.0 | 26.0  | 26.0    | 4    | 13   | 24.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 4    | 6.5              | 4    | 9.5  | 20.5 | 32      | 44    | 4    | 7    | 24.0    | 27.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 42 FT           | 11               | 12 | 8  | 8  | 4             | 6.5  | 4       | 9.5  | 21.6 | 27.0  | 27.0    | 4    | 14   | 23.0 | 26.0    | 4    | 14   | 18.0 | 19.0    | 4    | 6                | 4    | 9.5  | 20.8 | 32      | 44    | 4    | 6.5  | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 44 FT           | 11               | 12 | 8  | 8  | 4             | 6    | 4       | 9.5  | 21.6 | 27.0  | 27.0    | 4    | 13   | 23.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 4    | 6                | 4    | 9.5  | 20.8 | 32      | 44    | 4    | 6    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 46 FT           | 11               | 13 | 8  | 8  | 4             | 6    | 4       | 8.5  | 21.8 | 27.0  | 27.0    | 4    | 12   | 23.0 | 26.0    | 4    | 12   | 18.0 | 19.0    | 4    | 6                | 4    | 8.5  | 20.5 | 33      | 45    | 4    | 6.5  | 23.0    | 27.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 48 FT           | 12               | 13 | 8  | 8  | 4             | 6    | 4       | 8.5  | 21.5 | 28.0  | 28.0    | 4    | 13   | 23.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 4    | 6                | 4    | 8.5  | 20.8 | 33      | 45    | 4    | 6.5  | 24.0    | 27.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 50 FT           | 12               | 13 | 8  | 8  | 5             | 9    | 4       | 8.5  | 21.5 | 28.0  | 28.0    | 4    | 13   | 23.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 5    | 8.5              | 4    | 8.5  | 20.8 | 33      | 45    | 4    | 6    | 24.0    | 27.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |

| SPAN (S) = 4 FT |                  |      |      |      |               |       |         |      |      |      |         |      |      |      |         |      |      |      |         |    |                  |       |      |      |         |     |      | HEIGHT (HT) = 4 FT OR 5 FT |         |      |           |    |   |      |    |  |  |  |  |
|-----------------|------------------|------|------|------|---------------|-------|---------|------|------|------|---------|------|------|------|---------|------|------|------|---------|----|------------------|-------|------|------|---------|-----|------|----------------------------|---------|------|-----------|----|---|------|----|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |      |      |      | TOP SLAB BARS |       |         |      |      |      |         |      |      |      |         |      |      |      |         |    | BOTTOM SLAB BARS |       |      |      |         |     |      |                            |         |      | WALL BARS |    |   |      |    |  |  |  |  |
|                 |                  |      |      |      | A1 BARS       |       | J3 BARS |      |      |      | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |    | J4 BARS          |       |      |      | H3 BARS |     |      |                            |         |      |           |    |   |      |    |  |  |  |  |
|                 | SIZE             | SPA. | SIZE | SPA. | C1            | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA. | SIZE | SPA.    | C4 | K3               |       | SIZE | SPA. | C7      | Q10 | SIZE | SPA.                       | B2 BARS |      |           |    |   |      |    |  |  |  |  |
|                 |                  |      |      |      |               | HT=4' | HT=5'   |      |      |      |         |      |      |      |         |      |      |      |         |    | HT=4'            | HT=5' |      |      |         |     |      |                            |         |      |           |    |   |      |    |  |  |  |  |
|                 |                  |      |      |      |               |       |         |      |      |      |         |      |      |      |         |      |      |      |         |    |                  |       |      |      |         |     |      |                            |         |      |           |    |   |      |    |  |  |  |  |
| 1 FT            | 10               | 8    | 8    | 8    | 4             | 7     | 4       | 10.5 | 30.3 | 26.0 | 26.0    | 4    | 24   | 47.5 | 36.5    | 4    | 24   | 21.0 | 21.0    | 4  | 12               | 4     | 12   | 42.0 | 52      | 64  | 4    | 12                         | 28.0    | 28.0 | 5         | 12 | 5 | 12   | 12 |  |  |  |  |
| 2 FT            | 10               | 8    | 8    | 8    | 4             | 7     | 4       | 10.5 | 30.3 | 26.0 | 26.0    | 4    | 24   | 47.5 | 36.5    | 4    | 24   | 21.0 | 21.0    | 4  | 12               | 4     | 12   | 39.1 | 52      | 64  | 4    | 11                         | 27.0    | 28.0 | 5         | 12 | 5 | 12   | 12 |  |  |  |  |
| 2'- 4'          | 10               | 8    | 8    | 8    | 4             | 7     | 4       | 10.5 | 30.3 | 26.0 | 26.0    | 4    | 24   | 47.5 | 37.0    | 4    | 24   | 21.0 | 21.0    | 4  | 12               | 4     | 12   | 39.1 | 52      | 64  | 4    | 11                         | 27.0    | 28.0 | 5         | 12 | 5 | 12   | 12 |  |  |  |  |
| 4 FT            | 8                | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 30.3 | 24.0 | 24.0    | 4    | 24   | 47.5 | 37.0    | 4    | 24   | 20.0 | 20.0    | 4  | 12               | 4     | 12   | 34.8 | 52      | 64  | 4    | 11                         | 26.0    | 27.0 | 5         | 12 | 5 | 12   | 12 |  |  |  |  |
| 6 FT            | 8                | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 34.6 | 24.0 | 24.0    | 4    | 24   | 29.0 | 30.0    | 4    | 24   | 19.0 | 19.0    | 4  | 12               | 4     | 11.5 | 32.1 | 52      | 64  | 4    | 10.5                       | 25.0    | 26.0 | 5         | 12 | 5 | 12   | 12 |  |  |  |  |
| 8 FT            | 8                | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 31.4 | 24.0 | 24.0    | 4    | 24   | 27.0 | 28.0    | 4    | 24   | 19.0 | 19.0    | 4  | 12               | 4     | 11   | 30.3 | 52      | 64  | 4    | 9.5                        | 25.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 10 FT           | 8                | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 29.9 | 24.0 | 24.0    | 4    | 24   | 26.0 | 27.0    | 4    | 24   | 19.0 | 19.0    | 4  | 12               | 4     | 10.5 | 29.3 | 52      | 64  | 4    | 9                          | 25.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 12 FT           | 8                | 8    | 8    | 8    | 4             | 12    | 4       | 12   | 29.1 | 24.0 | 24.0    | 4    | 24   | 25.0 | 27.0    | 4    | 24   | 18.0 | 19.0    | 4  | 11.5             | 4     | 10   | 28.5 | 52      | 64  | 4    | 8.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 14 FT           | 8                | 8    | 8    | 8    | 4             | 12    | 4       | 11   | 28.5 | 24.0 | 24.0    | 4    | 23   | 25.0 | 26.0    | 4    | 23   | 18.0 | 19.0    | 4  | 10.5             | 4     | 9.5  | 28.1 | 52      | 64  | 4    | 7.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 16 FT           | 8                | 8    | 8    | 8    | 4             | 12    | 4       | 11   | 26.9 | 24.0 | 24.0    | 4    | 22   | 24.0 | 26.0    | 4    | 22   | 18.0 | 19.0    | 4  | 10               | 4     | 9.5  | 26.6 | 52      | 64  | 4    | 7.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 18 FT           | 8                | 8    | 8    | 8    | 4             | 11    | 4       | 10   | 26.8 | 24.0 | 24.0    | 4    | 21   | 24.0 | 26.0    | 4    | 21   | 18.0 | 19.0    | 4  | 9                | 4     | 8.5  | 26.5 | 52      | 64  | 4    | 7                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 20 FT           | 8                | 8    | 8    | 8    | 4             | 10    | 4       | 9    | 26.8 | 24.0 | 24.0    | 4    | 19   | 24.0 | 26.0    | 4    | 19   | 18.0 | 19.0    | 4  | 8                | 4     | 8    | 26.4 | 52      | 64  | 4    | 6.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 22 FT           | 8                | 8    | 8    | 8    | 4             | 9     | 4       | 8    | 26.6 | 24.0 | 24.0    | 4    | 17   | 24.0 | 26.0    | 4    | 17   | 18.0 | 18.0    | 4  | 7                | 4     | 7    | 26.4 | 52      | 64  | 4    | 6                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 24 FT           | 8                | 9    | 8    | 8    | 4             | 8.5   | 4       | 7.5  | 26.6 | 24.0 | 24.0    | 4    | 16   | 24.0 | 25.0    | 4    | 16   | 18.0 | 18.0    | 4  | 7.5              | 4     | 8.5  | 26.6 | 53      | 65  | 4    | 7                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 26 FT           | 8                | 9    | 8    | 8    | 4             | 8     | 4       | 7    | 26.6 | 24.0 | 24.0    | 4    | 14   | 24.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4  | 7                | 4     | 8    | 26.5 | 53      | 65  | 4    | 6.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 28 FT           | 8                | 10   | 8    | 8    | 4             | 7.5   | 4       | 6    | 26.6 | 24.0 | 24.0    | 4    | 13   | 24.0 | 25.0    | 4    | 13   | 18.0 | 18.0    | 4  | 7.5              | 4     | 9.5  | 26.8 | 54      | 66  | 4    | 7.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 30 FT           | 9                | 10   | 8    | 8    | 4             | 7.5   | 4       | 7.5  | 26.9 | 25.0 | 25.0    | 4    | 15   | 24.0 | 26.0    | 4    | 15   | 18.0 | 19.0    | 4  | 7                | 4     | 9    | 26.9 | 54      | 66  | 4    | 7                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 32 FT           | 9                | 10   | 8    | 8    | 4             | 7     | 4       | 7    | 26.9 | 25.0 | 25.0    | 4    | 14   | 24.0 | 26.0    | 4    | 14   | 18.0 | 19.0    | 4  | 6                | 4     | 8    | 26.8 | 54      | 66  | 4    | 6                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 34 FT           | 9                | 11   | 8    | 8    | 4             | 6.5   | 4       | 6.5  | 26.9 | 25.0 | 25.0    | 4    | 13   | 24.0 | 26.0    | 4    | 13   | 18.0 | 18.0    | 4  | 6.5              | 4     | 8.5  | 27.0 | 55      | 67  | 4    | 7                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 36 FT           | 10               | 11   | 8    | 8    | 4             | 7     | 4       | 6.5  | 27.1 | 26.0 | 26.0    | 4    | 14   | 23.0 | 26.0    | 4    | 14   | 18.0 | 19.0    | 4  | 6.5              | 4     | 8    | 27.1 | 55      | 67  | 4    | 7                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 38 FT           | 10               | 12   | 8    | 8    | 4             | 6.5   | 4       | 6    | 27.3 | 26.0 | 26.0    | 4    | 14   | 23.0 | 26.0    | 4    | 14   | 18.0 | 19.0    | 4  | 6.5              | 4     | 8    | 27.4 | 56      | 68  | 4    | 7.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 40 FT           | 10               | 12   | 8    | 8    | 4             | 6     | 5       | 8    | 27.1 | 26.0 | 26.0    | 4    | 13   | 23.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 4  | 6.5              | 4     | 7.5  | 27.4 | 56      | 68  | 4    | 7                          | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 42 FT           | 11               | 12   | 8    | 8    | 4             | 6.5   | 5       | 9    | 27.4 | 27.0 | 27.0    | 4    | 14   | 23.0 | 26.0    | 4    | 14   | 18.0 | 19.0    | 4  | 6                | 4     | 7    | 27.4 | 56      | 68  | 4    | 6.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 44 FT           | 11               | 12   | 8    | 8    | 4             | 6     | 5       | 8.5  | 27.4 | 27.0 | 27.0    | 4    | 13   | 23.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 4  | 6                | 4     | 6.5  | 27.4 | 56      | 68  | 4    | 6.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 46 FT           | 11               | 13   | 8    | 8    | 4             | 6     | 5       | 8.5  | 27.5 | 27.0 | 27.0    | 4    | 13   | 23.0 | 26.0    | 4    | 13   | 18.0 | 19.0    | 4  | 6                | 4     | 7    | 27.6 | 57      | 69  | 4    | 6.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 12   | 0  |  |  |  |  |
| 48 FT           | 12               | 13   | 8    | 8    | 4             | 6     | 5       | 8.5  | 27.6 | 28.0 | 28.0    | 4    | 14   | 23.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4  | 6                | 4     | 6.5  | 27.8 | 57      | 69  | 4    | 6.5                        | 24.0    | 26.0 | 5         | 12 | 5 | 11.5 | 0  |  |  |  |  |
| 50 FT           | 12               | 13   | 8    | 8    | 4             | 6     | 5       | 8.5  | 27.6 | 28.0 | 28.0    | 4    | 13   | 23.0 | 25.0    | 4    | 13   | 18.0 | 18.0    | 5  | 9                | 4     | 6    | 27.8 | 57      | 69  | 4    | 6                          | 24.0    | 26.0 | 5         | 12 | 5 | 11   | 0  |  |  |  |  |

| SPAN (S) = 4 FT |                  |    |    |    |               |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |      |      |         |      |           | HEIGHT (HT) = 6 FT OR 7 FT |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|------|------|---------|------|-----------|----------------------------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |      |      |         |      | WALL BARS |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |      |      | B1 BARS |      | B2 BARS   |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |       | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                       | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=6' | HT=7'   |      |      |      |         |      |      |      |         |      |                  |      |      |      | HT=6'   | HT=7' |      |      |         |      |           |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 10               | 8  | 8  | 8  | 4             | 6.5  | 4       | 10.5 | 30.3 | 26.0  | 26.0    | 4    | 24   | 47.5 | 36.5    | 4    | 24   | 22.0 | 21.0    | 4    | 12               | 4    | 9    | 42.0 | 76      | 88    | 4    | 11.5 | 40.0    | 28.0 | 5         | 12                         | 5    | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 10               | 8  | 8  | 8  | 4             | 6.5  | 4       | 10.5 | 30.3 | 26.0  | 26.0    | 4    | 24   | 47.5 | 36.5    | 4    | 24   | 21.0 | 21.0    | 4    | 12               | 4    | 8.5  | 42.0 | 76      | 88    | 4    | 11   | 40.0    | 28.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 10               | 8  | 8  | 8  | 4             | 6.5  | 4       | 10   | 30.3 | 26.0  | 26.0    | 4    | 24   | 47.5 | 37.0    | 4    | 24   | 21.0 | 21.0    | 4    | 12               | 4    | 7.5  | 42.0 | 76      | 88    | 4    | 11   | 40.0    | 28.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 10   | 30.3 | 24.0  | 24.0    | 4    | 24   | 47.5 | 37.0    | 4    | 24   | 20.0 | 20.0    | 4    | 12               | 4    | 7.5  | 42.0 | 76      | 88    | 4    | 11   | 29.0    | 27.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 10   | 30.3 | 24.0  | 24.0    | 4    | 24   | 47.5 | 29.0    | 4    | 24   | 19.0 | 19.0    | 4    | 12               | 4    | 7    | 42.0 | 76      | 88    | 4    | 10   | 27.0    | 26.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 9    | 30.3 | 24.0  | 24.0    | 4    | 24   | 47.5 | 28.0    | 4    | 24   | 19.0 | 19.0    | 4    | 12               | 4    | 6.5  | 42.0 | 76      | 88    | 4    | 9.5  | 26.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 8    | 43.1 | 24.0  | 24.0    | 4    | 24   | 28.0 | 27.0    | 4    | 24   | 18.0 | 19.0    | 4    | 12               | 4    | 6.5  | 40.6 | 76      | 88    | 4    | 9    | 25.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 7.5  | 40.5 | 24.0  | 24.0    | 4    | 24   | 27.0 | 26.0    | 4    | 24   | 18.0 | 19.0    | 4    | 11.5             | 4    | 6    | 39.1 | 76      | 88    | 4    | 8.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 6.5  | 39.3 | 24.0  | 24.0    | 4    | 23   | 26.0 | 26.0    | 4    | 23   | 18.0 | 19.0    | 4    | 10.5             | 5    | 6.5  | 38.4 | 76      | 88    | 4    | 8    | 25.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 6.5  | 35.5 | 24.0  | 24.0    | 4    | 23   | 24.0 | 25.0    | 4    | 23   | 18.0 | 19.0    | 4    | 10               | 5    | 6.5  | 35.4 | 76      | 88    | 4    | 7.5  | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                | 8  | 8  | 8  | 4             | 11.5 | 4       | 6    | 35.3 | 24.0  | 24.0    | 4    | 21   | 24.0 | 25.0    | 4    | 21   | 18.0 | 18.0    | 4    | 9                | 5    | 6    | 35.1 | 76      | 88    | 4    | 7    | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                | 8  | 8  | 8  | 4             | 10   | 5       | 6.5  | 35.0 | 24.0  | 28.0    | 4    | 19   | 24.0 | 25.0    | 4    | 19   | 18.0 | 18.0    | 4    | 8                | 6    | 6.5  | 38.0 | 76      | 88    | 4    | 6.5  | 24.0    | 26.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                | 9  | 8  | 8  | 4             | 9.5  | 5       | 6    | 34.6 | 24.0  | 28.0    | 4    | 18   | 24.0 | 25.0    | 4    | 18   | 18.0 | 18.0    | 4    | 8.5              | 5    | 6    | 36.1 | 77      | 89    | 4    | 8    | 25.0    | 26.0 | 5         | 12                         | 5    | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 8                | 9  | 9  | 8  | 4             | 8.5  | 5       | 6.5  | 34.1 | 24.0  | 28.0    | 4    | 16   | 24.0 | 25.0    | 4    | 16   | 18.0 | 18.0    | 4    | 8                | 5    | 7    | 35.6 | 77      | 89    | 4    | 7.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 8                | 9  | 9  | 8  | 4             | 8    | 5       | 6    | 34.0 | 24.0  | 28.0    | 4    | 15   | 24.0 | 25.0    | 4    | 15   | 18.0 | 18.0    | 4    | 7.5              | 5    | 6.5  | 35.5 | 77      | 89    | 4    | 7    | 25.0    | 26.0 | 5         | 12                         | 5    | 11   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 8                | 10 | 9  | 8  | 4             | 7.5  | 6       | 7.5  | 36.8 | 24.0  | 28.0    | 4    | 14   | 24.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4    | 7.5              | 5    | 7    | 36.6 | 78      | 90    | 4    | 7.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 9                | 10 | 9  | 8  | 4             | 8    | 5       | 6    | 35.0 | 25.0  | 29.0    | 4    | 15   | 24.0 | 25.0    | 4    | 15   | 18.0 | 18.0    | 4    | 7                | 5    | 6.5  | 36.4 | 78      | 90    | 4    | 7    | 25.0    | 26.0 | 5         | 12                         | 5    | 10   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 9                | 10 | 9  | 8  | 4             | 7.5  | 5       | 6    | 35.0 | 25.0  | 29.0    | 4    | 14   | 24.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4    | 6.5              | 5    | 6    | 36.3 | 78      | 90    | 4    | 6.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 9                | 11 | 9  | 8  | 4             | 7    | 5       | 6    | 34.9 | 25.0  | 29.0    | 4    | 13   | 24.0 | 25.0    | 4    | 13   | 18.0 | 18.0    | 4    | 7                | 5    | 6.5  | 37.4 | 79      | 91    | 4    | 7    | 25.0    | 26.0 | 5         | 12                         | 5    | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 10               | 11 | 9  | 8  | 4             | 7    | 5       | 6.5  | 35.9 | 26.0  | 30.0    | 4    | 15   | 24.0 | 25.0    | 4    | 15   | 18.0 | 18.0    | 4    | 7                | 5    | 6    | 37.0 | 79      | 91    | 4    | 7    | 25.0    | 26.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 10               | 11 | 9  | 8  | 4             | 7    | 5       | 6    | 35.8 | 26.0  | 30.0    | 4    | 14   | 24.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4    | 6.5              | 6    | 7.5  | 40.0 | 79      | 91    | 4    | 6.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 10               | 12 | 9  | 8  | 4             | 6.5  | 5       | 6    | 35.6 | 26.0  | 30.0    | 4    | 13   | 24.0 | 25.0    | 4    | 13   | 18.0 | 18.0    | 4    | 6.5              | 5    | 6    | 38.3 | 80      | 92    | 4    | 7    | 25.0    | 26.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 10               | 12 | 9  | 8  | 4             | 6    | 5       | 6    | 35.6 | 30.0  | 30.0    | 4    | 12   | 24.0 | 25.0    | 4    | 12   | 18.0 | 18.0    | 4    | 6.5              | 6    | 7.5  | 41.1 | 80      | 92    | 4    | 6.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 11               | 12 | 9  | 8  | 4             | 6.5  | 6       | 7.5  | 39.5 | 31.0  | 35.0    | 4    | 14   | 24.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4    | 6                | 6    | 7    | 40.9 | 80      | 92    | 4    | 6.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 11               | 13 | 9  | 8  | 4             | 6    | 6       | 6.5  | 39.4 | 31.0  | 35.0    | 4    | 13   | 24.0 | 25.0    | 4    | 13   | 18.0 | 18.0    | 4    | 6.5              | 6    | 7.5  | 42.0 | 81      | 93    | 4    | 6.5  | 26.0    | 26.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 11               | 13 | 10 | 8  | 4             | 6    | 5       | 6    | 36.3 | 27.0  | 31.0    | 4    | 13   | 23.0 | 25.0    | 4    | 13   | 18.0 | 18.0    | 4    | 6                | 5    | 6.5  | 38.4 | 81      | 93    | 4    | 6.5  | 25.0    | 26.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 12               | 13 | 11 | 8  | 4             | 6    | 5       | 7    | 37.0 | 28.0  | 32.0    | 4    | 14   | 23.0 | 25.0    | 4    | 14   | 18.0 | 18.0    | 4    | 6                | 5    | 7.5  | 37.9 | 81      | 93    | 4    | 6    | 25.0    | 26.0 | 5         | 12                         | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

BRYAN A. HARTNAGEL

NUMBER PE-2002024473

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE TRIPLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 4 FEET  
HEIGHT (HT): 6 THRU 7 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.87A

SHEET NO.  
3 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

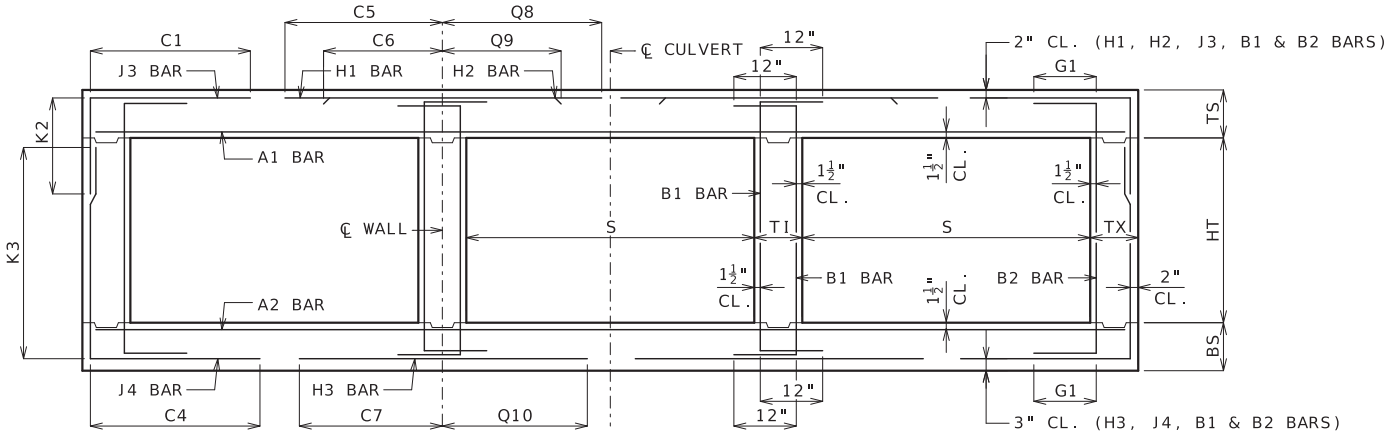
| SPAN (S) = 5 FT |                     |    |    |    |               |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |      |      |         |      |           | HEIGHT (HT) = 3 FT OR 4 FT |      |      |    |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|------|------|---------|------|-----------|----------------------------|------|------|----|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |      |      |         |      | WALL BARS |                            |      |      |    |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |      |      | B1 BARS |      | B2 BARS   |                            |      |      |    |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |       | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                       | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=3' | HT=4'   |      |      |      |         |      |      |      |         |      |                  |      |      |      | HT=3'   | HT=4' |      |      |         |      |           |                            |      |      |    |  |  |  |  |  |  |  |  |
| 1 FT            | 10                  | 8  | 8  | 8  | 5             | 9    | 4       | 10.5 | 33.9 | 26.0  | 26.0    | 4    | 19   | 56.5 | 42.5    | 4    | 19   | 22.0 | 21.0    | 4    | 12               | 4    | 12   | 33.9 | 40      | 52    | 4    | 8.5  | 30.0    | 31.0 | 5         | 12                         | 5    | 12   | 2  |  |  |  |  |  |  |  |  |
| 2 FT            | 11                  | 8  | 8  | 8  | 4             | 6    | 4       | 9.5  | 33.9 | 27.0  | 27.0    | 4    | 21   | 56.5 | 42.5    | 4    | 21   | 22.0 | 21.0    | 4    | 12               | 4    | 12   | 31.1 | 40      | 52    | 4    | 8.5  | 30.0    | 31.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11                  | 8  | 8  | 8  | 4             | 6    | 4       | 9.5  | 33.9 | 27.0  | 27.0    | 4    | 20   | 56.5 | 46.0    | 4    | 20   | 22.0 | 21.0    | 4    | 12               | 4    | 12   | 31.1 | 40      | 52    | 4    | 8.5  | 30.0    | 31.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 8  | 8  | 8  | 4             | 10.5 | 4       | 12   | 32.1 | 24.0  | 24.0    | 4    | 20   | 38.0 | 46.0    | 4    | 20   | 20.0 | 20.0    | 4    | 12               | 4    | 12   | 28.4 | 40      | 52    | 4    | 8.5  | 29.0    | 30.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 29.3 | 24.0  | 24.0    | 4    | 21   | 31.0 | 34.0    | 4    | 21   | 20.0 | 20.0    | 4    | 12               | 4    | 12   | 27.0 | 40      | 52    | 4    | 8    | 28.0    | 29.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 8  | 8  | 8  | 4             | 12   | 4       | 12   | 27.5 | 24.0  | 24.0    | 4    | 20   | 30.0 | 31.0    | 4    | 20   | 19.0 | 19.0    | 4    | 11               | 4    | 11   | 26.3 | 40      | 52    | 4    | 7    | 28.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8  | 8  | 8  | 4             | 11   | 4       | 12   | 26.6 | 24.0  | 24.0    | 4    | 18   | 29.0 | 30.0    | 4    | 18   | 19.0 | 19.0    | 4    | 9.5              | 4    | 10.5 | 25.6 | 40      | 52    | 4    | 6.5  | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8  | 8  | 8  | 4             | 10   | 4       | 10.5 | 26.1 | 24.0  | 24.0    | 4    | 16   | 28.0 | 30.0    | 4    | 16   | 19.0 | 19.0    | 4    | 8                | 4    | 9.5  | 25.3 | 40      | 52    | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8  | 8  | 8  | 4             | 8.5  | 4       | 9.5  | 25.6 | 24.0  | 24.0    | 4    | 14   | 28.0 | 29.0    | 4    | 14   | 19.0 | 19.0    | 4    | 7                | 4    | 8.5  | 25.0 | 40      | 52    | 5    | 7    | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                   | 9  | 8  | 8  | 4             | 8    | 4       | 8.5  | 25.6 | 24.0  | 24.0    | 4    | 13   | 28.0 | 29.0    | 4    | 13   | 19.0 | 19.0    | 4    | 7                | 4    | 11   | 24.3 | 41      | 53    | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                   | 9  | 8  | 8  | 4             | 7.5  | 4       | 8    | 24.8 | 24.0  | 24.0    | 4    | 12   | 27.0 | 28.0    | 4    | 12   | 19.0 | 19.0    | 4    | 7                | 4    | 10.5 | 23.5 | 41      | 53    | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                   | 9  | 8  | 8  | 4             | 7    | 4       | 7.5  | 24.6 | 24.0  | 24.0    | 5    | 17   | 27.0 | 28.0    | 5    | 17   | 19.0 | 19.0    | 4    | 6                | 4    | 9.5  | 23.5 | 41      | 53    | 5    | 7    | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 22 FT           | 9                   | 10 | 8  | 8  | 4             | 7    | 4       | 9    | 24.3 | 25.0  | 25.0    | 4    | 12   | 27.0 | 29.0    | 4    | 12   | 19.0 | 19.0    | 4    | 6.5              | 4    | 12   | 23.1 | 42      | 54    | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 24 FT           | 9                   | 11 | 8  | 8  | 4             | 6.5  | 4       | 8    | 24.4 | 25.0  | 25.0    | 5    | 17   | 27.0 | 29.0    | 5    | 17   | 19.0 | 19.0    | 4    | 6.5              | 4    | 10.5 | 22.6 | 43      | 55    | 4    | 6    | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 26 FT           | 10                  | 11 | 8  | 8  | 4             | 6.5  | 4       | 8.5  | 23.9 | 26.0  | 26.0    | 5    | 18   | 26.0 | 29.0    | 5    | 18   | 19.0 | 19.0    | 4    | 6                | 4    | 10.5 | 22.9 | 43      | 55    | 5    | 8    | 26.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 28 FT           | 10                  | 11 | 8  | 8  | 4             | 6    | 4       | 8    | 23.9 | 26.0  | 26.0    | 5    | 17   | 26.0 | 29.0    | 5    | 17   | 19.0 | 19.0    | 5    | 8.5              | 4    | 10.5 | 22.9 | 43      | 55    | 5    | 8    | 26.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 30 FT           | 10                  | 12 | 8  | 8  | 5             | 8    | 4       | 7    | 24.0 | 26.0  | 26.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 19.0 | 19.0    | 5    | 9                | 4    | 9.5  | 22.5 | 44      | 56    | 5    | 8.5  | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 32 FT           | 11                  | 12 | 8  | 8  | 5             | 9    | 4       | 8    | 23.6 | 27.0  | 27.0    | 5    | 17   | 26.0 | 29.0    | 5    | 17   | 19.0 | 19.0    | 5    | 8.5              | 4    | 9.5  | 22.8 | 44      | 56    | 5    | 8    | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 34 FT           | 11                  | 13 | 8  | 8  | 5             | 8.5  | 4       | 7    | 23.8 | 27.0  | 27.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 19.0 | 19.0    | 5    | 8.5              | 4    | 8.5  | 22.5 | 45      | 57    | 5    | 8.5  | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 36 FT           | 12                  | 13 | 8  | 8  | 5             | 8.5  | 4       | 8    | 23.5 | 28.0  | 28.0    | 5    | 17   | 26.0 | 29.0    | 5    | 17   | 19.0 | 19.0    | 5    | 8                | 4    | 8.5  | 22.8 | 45      | 57    | 5    | 8    | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 38 FT           | 12                  | 14 | 8  | 8  | 5             | 8    | 4       | 7    | 23.6 | 28.0  | 28.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 19.0 | 19.0    | 5    | 8                | 4    | 7.5  | 22.6 | 46      | 58    | 5    | 8.5  | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 40 FT           | 13                  | 14 | 8  | 8  | 5             | 8    | 4       | 7.5  | 23.4 | 29.0  | 29.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 19.0 | 19.0    | 5    | 8                | 4    | 7.5  | 22.8 | 46      | 58    | 5    | 8    | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 42 FT           | 13                  | 14 | 8  | 8  | 5             | 7.5  | 4       | 7.5  | 23.4 | 29.0  | 29.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 19.0 | 19.0    | 5    | 7.5              | 4    | 7.5  | 22.8 | 46      | 58    | 5    | 7.5  | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 44 FT           | 13                  | 15 | 8  | 8  | 5             | 7.5  | 4       | 7    | 23.6 | 29.0  | 29.0    | 5    | 15   | 26.0 | 29.0    | 5    | 15   | 19.0 | 19.0    | 5    | 7.5              | 4    | 7    | 22.8 | 47      | 59    | 5    | 8    | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 46 FT           | 14                  | 15 | 8  | 8  | 5             | 7.5  | 4       | 7    | 23.4 | 30.0  | 30.0    | 5    | 16   | 25.0 | 29.0    | 5    | 16   | 18.0 | 19.0    | 5    | 7.5              | 4    | 7    | 22.9 | 47      | 59    | 5    | 7.5  | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 48 FT           | 14                  | 15 | 8  | 8  | 5             | 7    | 4       | 7    | 23.4 | 30.0  | 30.0    | 5    | 15   | 25.0 | 29.0    | 5    | 15   | 18.0 | 19.0    | 5    | 7                | 4    | 7    | 22.9 | 47      | 59    | 5    | 7    | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 50 FT           | 14                  | 16 | 8  | 8  | 5             | 7    | 4       | 6.5  | 23.6 | 30.0  | 30.0    | 5    | 15   | 25.0 | 29.0    | 5    | 15   | 18.0 | 19.0    | 5    | 7                | 4    | 6.5  | 22.9 | 48      | 60    | 5    | 7.5  | 26.0    | 30.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |

| SPAN (S) = 5 FT |                     |      |      |      |               |       |         |      |      |      |         |      |      |      |         |      |      |      |                  |    |         |       |      |      |         |     |      |      |           | HEIGHT (HT) = 5 FT OR 6 FT |         |    |   |      |    |  |  |  |  |  |  |
|-----------------|---------------------|------|------|------|---------------|-------|---------|------|------|------|---------|------|------|------|---------|------|------|------|------------------|----|---------|-------|------|------|---------|-----|------|------|-----------|----------------------------|---------|----|---|------|----|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |       |         |      |      |      |         |      |      |      |         |      |      |      | BOTTOM SLAB BARS |    |         |       |      |      |         |     |      |      | WALL BARS |                            |         |    |   |      |    |  |  |  |  |  |  |
|                 |                     |      |      |      | A1 BARS       |       | J3 BARS |      |      |      | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS          |    | J4 BARS |       |      |      | H3 BARS |     |      |      | B1 BARS   |                            | B2 BARS |    |   |      |    |  |  |  |  |  |  |
|                 | SIZE                | SPA. | SIZE | SPA. | C1            | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA. | SIZE | SPA.             | C4 | K3      |       | SIZE | SPA. | C7      | Q10 | SIZE | SPA. | SIZE      | SPA.                       | G1      |    |   |      |    |  |  |  |  |  |  |
|                 |                     |      |      |      |               | HT=5' | HT=6'   |      |      |      |         |      |      |      |         |      |      |      |                  |    | HT=5'   | HT=6' |      |      |         |     |      |      |           |                            |         |    |   |      |    |  |  |  |  |  |  |
| 1 FT            | 11                  | 8    | 8    | 8    | 4             | 6     | 4       | 9.5  | 33.9 | 27.0 | 27.0    | 4    | 22   | 56.5 | 42.5    | 4    | 22   | 23.0 | 23.0             | 4  | 12      | 4     | 10   | 47.5 | 64      | 76  | 4    | 8.5  | 31.0      | 31.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 2 FT            | 11                  | 8    | 8    | 8    | 4             | 6     | 4       | 9.5  | 33.9 | 27.0 | 27.0    | 4    | 21   | 56.5 | 42.5    | 4    | 21   | 22.0 | 22.0             | 4  | 11      | 4     | 9.5  | 42.8 | 64      | 76  | 4    | 8    | 30.0      | 31.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 2'- 4'          | 11                  | 8    | 8    | 8    | 4             | 6     | 4       | 9.5  | 33.9 | 27.0 | 27.0    | 4    | 20   | 56.5 | 46.0    | 4    | 20   | 22.0 | 22.0             | 4  | 11      | 4     | 9    | 42.8 | 64      | 76  | 4    | 8    | 30.0      | 31.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 4 FT            | 8                   | 8    | 8    | 8    | 4             | 10    | 4       | 10   | 33.9 | 24.0 | 24.0    | 4    | 20   | 56.5 | 46.0    | 4    | 20   | 21.0 | 21.0             | 4  | 12      | 4     | 9    | 38.9 | 64      | 76  | 4    | 8.5  | 29.0      | 30.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 6 FT            | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 10.5 | 38.3 | 24.0 | 24.0    | 4    | 21   | 33.0 | 35.0    | 4    | 21   | 20.0 | 20.0             | 4  | 12      | 4     | 8.5  | 35.5 | 64      | 76  | 4    | 7.5  | 28.0      | 30.0                       | 5       | 12 | 5 | 12   | 12 |  |  |  |  |  |  |
| 8 FT            | 8                   | 8    | 8    | 8    | 4             | 12    | 4       | 10   | 34.4 | 24.0 | 24.0    | 4    | 20   | 30.0 | 31.0    | 4    | 20   | 19.0 | 20.0             | 4  | 10.5    | 4     | 8    | 33.5 | 64      | 76  | 4    | 7    | 28.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 10 FT           | 8                   | 8    | 8    | 8    | 4             | 10.5  | 4       | 9    | 32.9 | 24.0 | 24.0    | 4    | 18   | 29.0 | 30.0    | 4    | 18   | 19.0 | 19.0             | 4  | 9       | 4     | 7.5  | 32.3 | 64      | 76  | 4    | 6.5  | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 12 FT           | 8                   | 8    | 8    | 8    | 4             | 9.5   | 4       | 8    | 31.9 | 24.0 | 24.0    | 4    | 16   | 28.0 | 30.0    | 4    | 16   | 19.0 | 19.0             | 4  | 7.5     | 4     | 7    | 31.3 | 64      | 76  | 4    | 6    | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 14 FT           | 8                   | 8    | 8    | 8    | 4             | 8.5   | 4       | 7    | 31.1 | 24.0 | 24.0    | 4    | 14   | 28.0 | 29.0    | 4    | 14   | 19.0 | 19.0             | 4  | 7       | 4     | 6    | 30.8 | 64      | 76  | 5    | 7    | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 16 FT           | 8                   | 9    | 8    | 8    | 4             | 8     | 4       | 6.5  | 30.8 | 24.0 | 24.0    | 4    | 13   | 28.0 | 29.0    | 4    | 13   | 19.0 | 19.0             | 4  | 7       | 4     | 7    | 30.9 | 65      | 77  | 4    | 6    | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 18 FT           | 8                   | 9    | 8    | 8    | 4             | 7.5   | 4       | 6.5  | 29.1 | 24.0 | 24.0    | 4    | 12   | 27.0 | 28.0    | 4    | 12   | 19.0 | 19.0             | 4  | 6.5     | 4     | 7    | 29.1 | 65      | 77  | 4    | 6    | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 20 FT           | 8                   | 9    | 8    | 8    | 4             | 7     | 5       | 7    | 29.0 | 24.0 | 24.0    | 5    | 17   | 27.0 | 28.0    | 5    | 17   | 19.0 | 19.0             | 4  | 6       | 4     | 6.5  | 29.0 | 65      | 77  | 5    | 7.5  | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 22 FT           | 9                   | 10   | 8    | 8    | 4             | 7     | 4       | 6.5  | 29.1 | 25.0 | 25.0    | 4    | 12   | 26.0 | 29.0    | 4    | 12   | 19.0 | 19.0             | 4  | 6       | 4     | 7.5  | 29.3 | 66      | 78  | 4    | 6    | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 24 FT           | 9                   | 10   | 8    | 8    | 4             | 6.5   | 4       | 6    | 29.1 | 25.0 | 25.0    | 5    | 17   | 26.0 | 29.0    | 5    | 17   | 19.0 | 19.0             | 5  | 8.5     | 4     | 7    | 29.1 | 66      | 78  | 5    | 7.5  | 27.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 26 FT           | 10                  | 11   | 8    | 8    | 4             | 6.5   | 5       | 8    | 29.4 | 26.0 | 26.0    | 4    | 12   | 26.0 | 29.0    | 4    | 12   | 19.0 | 19.0             | 4  | 6       | 4     | 6.5  | 29.4 | 67      | 79  | 5    | 8.5  | 26.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 28 FT           | 10                  | 11   | 8    | 8    | 4             | 6     | 5       | 7.5  | 29.3 | 26.0 | 26.0    | 5    | 17   | 26.0 | 29.0    | 5    | 17   | 19.0 | 19.0             | 5  | 8.5     | 4     | 6    | 29.4 | 67      | 79  | 5    | 8    | 26.0      | 29.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 30 FT           | 10                  | 12   | 8    | 8    | 5             | 8.5   | 5       | 7.5  | 29.3 | 26.0 | 26.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 19.0 | 19.0             | 5  | 9       | 4     | 6    | 29.5 | 68      | 80  | 5    | 8.5  | 26.0      | 30.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 32 FT           | 11                  | 12   | 8    | 8    | 5             | 9     | 5       | 8    | 29.5 | 27.0 | 31.0    | 5    | 17   | 26.0 | 29.0    | 5    | 17   | 19.0 | 19.0             | 5  | 8.5     | 5     | 8    | 29.6 | 68      | 80  | 5    | 8    | 26.0      | 30.0                       | 5       | 12 | 5 | 12   | 0  |  |  |  |  |  |  |
| 34 FT           | 11                  | 13   | 8    | 8    | 5             | 8.5   | 5       | 7.5  | 29.5 | 27.0 | 31.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 19.0 | 19.0             | 5  | 8.5     | 5     | 8.5  | 29.8 | 69      | 81  | 5    | 8.5  | 26.0      | 30.0                       | 5       | 12 | 5 | 11.5 | 0  |  |  |  |  |  |  |
| 36 FT           | 12                  | 13   | 8    | 8    | 5             | 8.5   | 5       | 8    | 29.8 | 28.0 | 32.0    | 5    | 17   | 26.0 | 29.0    | 5    | 17   | 18.0 | 19.0             | 5  | 8       | 5     | 8    | 29.9 | 69      | 81  | 5    | 8    | 26.0      | 30.0                       | 5       | 12 | 5 | 11   | 0  |  |  |  |  |  |  |
| 38 FT           | 12                  | 14   | 8    | 8    | 5             | 8     | 5       | 7.5  | 29.8 | 28.0 | 32.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 18.0 | 19.0             | 5  | 8.5     | 5     | 8.5  | 30.1 | 70      | 82  | 5    | 8.5  | 26.0      | 30.0                       | 5       | 12 | 5 | 10   | 0  |  |  |  |  |  |  |
| 40 FT           | 12                  | 14   | 8    | 8    | 5             | 7.5   | 5       | 7    | 29.8 | 28.0 | 32.0    | 5    | 15   | 26.0 | 29.0    | 5    | 15   | 18.0 | 19.0             | 5  | 8       | 5     | 8    | 30.0 | 70      | 82  | 5    | 8    | 26.0      | 30.0                       | 5       | 12 | 5 | 9.5  | 0  |  |  |  |  |  |  |
| 42 FT           | 13                  | 14   | 8    | 8    | 5             | 8     | 5       | 7.5  | 29.9 | 29.0 | 33.0    | 5    | 16   | 26.0 | 29.0    | 5    | 16   | 18.0 | 19.0             | 5  | 7.5     | 5     | 7.5  | 30.1 | 70      | 82  | 5    | 7.5  | 26.0      | 30.0                       | 5       | 12 | 5 | 9.5  | 0  |  |  |  |  |  |  |
| 44 FT           | 13                  | 15   | 8    | 8    | 5             | 7.5   | 5       | 7    | 30.0 | 29.0 | 33.0    | 5    | 15   | 26.0 | 29.0    | 5    | 15   | 18.0 | 19.0             | 5  | 8       | 5     | 8    | 30.4 | 71      | 83  | 5    | 8    | 27.0      | 30.0                       | 5       | 12 | 5 | 9.5  | 0  |  |  |  |  |  |  |
| 46 FT           | 14                  | 15   | 8    | 8    | 5             | 7.5   | 5       | 6.5  | 30.1 | 30.0 | 34.0    | 5    | 16   | 26.0 | 28.0    | 5    | 16   | 18.0 | 19.0             | 5  | 7.5     | 5     | 7.5  | 30.5 | 71      | 83  | 5    | 7.5  | 27.0      | 30.0                       | 5       | 12 | 5 | 9.5  | 0  |  |  |  |  |  |  |
| 48 FT           | 14                  | 15   | 9    | 8    | 5             | 7.5   | 5       | 8    | 30.6 | 30.0 | 34.0    | 5    | 16   | 26.0 | 28.0    | 5    | 16   | 18.0 | 19.0             | 5  | 7.5     | 5     | 8    | 30.8 | 71      | 83  | 5    | 7.5  | 27.0      | 30.0                       | 5       | 12 | 5 | 9    | 0  |  |  |  |  |  |  |
| 50 FT           | 14                  | 16   | 9    | 8    | 5             | 7     | 5       | 7.5  | 30.8 | 30.0 | 34.0    | 5    | 15   | 26.0 | 28.0    | 5    | 15   | 18.0 | 19.0             | 5  | 7.5     | 5     | 8    | 31.0 | 72      | 84  | 5    | 7.5  | 27.0      | 30.0                       | 5       | 12 | 5 | 8.5  | 0  |  |  |  |  |  |  |



| SPAN (S) = 5 FT |                  |    |    |    |               |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |      |      |         |      |           | HEIGHT (HT) = 7 FT OR 8 FT |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|------|------|---------|------|-----------|----------------------------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |      |      |         |      | WALL BARS |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |      |      | B1 BARS |      | B2 BARS   |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |       | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                       | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=7' | HT=8'   |      |      |      |         |      |      |      |         |      |                  |      |      |      | HT=7'   | HT=8' |      |      |         |      |           |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 11               | 8  | 8  | 8  | 4             | 6    | 4       | 9    | 33.9 | 27.0  | 27.0    | 4    | 22   | 56.5 | 42.5    | 4    | 22   | 23.0 | 23.0    | 4    | 11               | 4    | 7    | 48.0 | 88      | 100   | 4    | 8    | 46.0    | 31.0 | 5         | 12                         | 5    | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 8  | 4             | 6    | 4       | 8.5  | 33.9 | 27.0  | 27.0    | 4    | 21   | 56.5 | 42.5    | 4    | 21   | 23.0 | 23.0    | 4    | 10.5             | 4    | 6.5  | 48.0 | 88      | 100   | 4    | 8    | 32.0    | 31.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11               | 8  | 8  | 8  | 4             | 6    | 4       | 7    | 33.9 | 27.0  | 27.0    | 4    | 20   | 56.5 | 46.0    | 4    | 20   | 23.0 | 23.0    | 4    | 10.5             | 4    | 6    | 48.0 | 88      | 100   | 4    | 8    | 32.0    | 31.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 9.5  | 4       | 7    | 33.9 | 24.0  | 24.0    | 4    | 20   | 56.5 | 46.0    | 4    | 20   | 21.0 | 21.0    | 4    | 11.5             | 4    | 6    | 48.0 | 88      | 100   | 4    | 8    | 31.0    | 30.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 7    | 33.9 | 24.0  | 24.0    | 4    | 21   | 56.5 | 35.0    | 4    | 21   | 20.0 | 20.0    | 4    | 11               | 5    | 6    | 48.0 | 88      | 100   | 4    | 7.5  | 29.0    | 30.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 12   | 4       | 6.5  | 51.8 | 24.0  | 24.0    | 4    | 20   | 34.0 | 31.0    | 4    | 20   | 19.0 | 20.0    | 4    | 10               | 5    | 6    | 46.0 | 88      | 100   | 4    | 7    | 28.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 9  | 8  | 4             | 11   | 4       | 7    | 43.8 | 24.0  | 24.0    | 4    | 18   | 30.0 | 30.0    | 4    | 18   | 19.0 | 20.0    | 4    | 9                | 4    | 6    | 41.6 | 88      | 100   | 4    | 6.5  | 28.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 8  | 9  | 8  | 4             | 9.5  | 4       | 6    | 41.3 | 24.0  | 24.0    | 4    | 16   | 29.0 | 30.0    | 4    | 16   | 19.0 | 19.0    | 4    | 8                | 5    | 6    | 40.4 | 88      | 100   | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 9  | 9  | 8  | 4             | 9    | 5       | 7    | 39.9 | 24.0  | 28.0    | 4    | 15   | 28.0 | 29.0    | 4    | 15   | 19.0 | 19.0    | 4    | 8                | 5    | 6.5  | 41.4 | 89      | 101   | 4    | 6.5  | 27.0    | 29.0 | 5         | 12                         | 5    | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 9  | 9  | 8  | 4             | 8    | 5       | 6    | 39.1 | 24.0  | 28.0    | 4    | 13   | 28.0 | 29.0    | 4    | 13   | 19.0 | 19.0    | 4    | 7                | 5    | 6    | 40.8 | 89      | 101   | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 11   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 8                | 9  | 9  | 8  | 4             | 7.5  | 5       | 6    | 36.5 | 24.0  | 28.0    | 4    | 13   | 26.0 | 28.0    | 4    | 13   | 19.0 | 19.0    | 4    | 7                | 5    | 6    | 38.1 | 89      | 101   | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 8                | 9  | 9  | 8  | 4             | 7    | 6       | 7    | 39.1 | 24.0  | 32.0    | 5    | 18   | 26.0 | 28.0    | 5    | 18   | 19.0 | 19.0    | 4    | 6                | 6    | 7    | 40.9 | 89      | 101   | 5    | 7.5  | 27.0    | 29.0 | 5         | 12                         | 5    | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 8                | 10 | 9  | 8  | 4             | 6.5  | 6       | 7    | 38.8 | 24.0  | 28.0    | 5    | 17   | 27.0 | 28.0    | 5    | 17   | 19.0 | 20.0    | 4    | 6.5              | 5    | 6    | 39.0 | 90      | 102   | 5    | 8    | 27.0    | 29.0 | 5         | 12                         | 5    | 10   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 9                | 11 | 9  | 8  | 4             | 6.5  | 5       | 6    | 37.0 | 25.0  | 29.0    | 5    | 18   | 26.0 | 28.0    | 5    | 18   | 19.0 | 19.0    | 4    | 6.5              | 5    | 6    | 39.8 | 91      | 103   | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 9                | 11 | 9  | 8  | 4             | 6    | 5       | 6    | 36.9 | 25.0  | 29.0    | 5    | 16   | 26.0 | 28.0    | 5    | 16   | 19.0 | 19.0    | 4    | 6                | 5    | 6    | 39.6 | 91      | 103   | 5    | 8.5  | 27.0    | 29.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 10               | 12 | 9  | 8  | 4             | 6    | 5       | 6    | 37.9 | 30.0  | 30.0    | 5    | 17   | 26.0 | 28.0    | 5    | 17   | 19.0 | 19.0    | 4    | 6                | 5    | 6    | 40.3 | 92      | 104   | 4    | 6    | 27.0    | 29.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 10               | 12 | 9  | 8  | 4             | 6    | 5       | 6    | 37.8 | 30.0  | 30.0    | 5    | 16   | 26.0 | 28.0    | 5    | 16   | 19.0 | 19.0    | 4    | 6                | 6    | 7.5  | 43.1 | 92      | 104   | 5    | 8.5  | 27.0    | 29.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 11               | 12 | 10 | 8  | 4             | 6    | 5       | 6.5  | 38.4 | 31.0  | 31.0    | 5    | 17   | 26.0 | 28.0    | 5    | 17   | 18.0 | 19.0    | 5    | 9                | 5    | 6.5  | 39.6 | 92      | 104   | 5    | 8    | 27.0    | 29.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 11               | 13 | 10 | 8  | 5             | 9    | 5       | 6.5  | 38.3 | 31.0  | 31.0    | 5    | 16   | 26.0 | 28.0    | 5    | 16   | 19.0 | 19.0    | 5    | 9                | 5    | 6.5  | 40.4 | 93      | 105   | 5    | 8.5  | 28.0    | 30.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 12               | 13 | 10 | 8  | 5             | 9    | 5       | 6.5  | 39.1 | 32.0  | 32.0    | 5    | 17   | 26.0 | 28.0    | 5    | 17   | 18.0 | 19.0    | 5    | 8.5              | 5    | 6.5  | 40.3 | 93      | 105   | 5    | 8    | 27.0    | 30.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 12               | 14 | 10 | 8  | 5             | 8.5  | 5       | 6    | 39.0 | 32.0  | 32.0    | 5    | 17   | 26.0 | 28.0    | 5    | 17   | 18.0 | 19.0    | 5    | 9                | 5    | 6.5  | 40.9 | 94      | 106   | 5    | 8.5  | 28.0    | 30.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 12               | 14 | 11 | 8  | 5             | 8    | 5       | 7    | 38.9 | 32.0  | 32.0    | 5    | 16   | 26.0 | 28.0    | 5    | 16   | 18.0 | 19.0    | 5    | 8.5              | 5    | 7    | 40.8 | 94      | 106   | 5    | 8    | 28.0    | 30.0 | 5         | 12                         | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 13               | 14 | 11 | 8  | 5             | 8.5  | 5       | 7    | 39.6 | 33.0  | 33.0    | 5    | 17   | 26.0 | 28.0    | 5    | 17   | 18.0 | 19.0    | 5    | 8                | 5    | 7    | 40.5 | 94      | 106   | 5    | 7.5  | 28.0    | 30.0 | 5         | 12                         | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 13               | 15 | 11 | 8  | 5             | 8    | 5       | 6.5  | 39.5 | 33.0  | 33.0    | 5    | 16   | 26.0 | 28.0    | 5    | 16   | 18.0 | 19.0    | 5    | 8                | 5    | 7    | 41.3 | 95      | 107   | 5    | 8    | 28.0    | 30.0 | 5         | 12                         | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 13               | 15 | 12 | 8  | 5             | 7.5  | 5       | 6.5  | 39.5 | 33.0  | 33.0    | 5    | 15   | 26.0 | 28.0    | 5    | 15   | 18.0 | 19.0    | 5    | 8                | 5    | 6.5  | 41.0 | 95      | 107   | 5    | 7.5  | 28.0    | 30.0 | 5         | 12                         | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 14               | 15 | 12 | 8  | 5             | 8    | 5       | 6.5  | 40.3 | 34.0  | 34.0    | 5    | 17   | 26.0 | 27.0    | 5    | 17   | 18.0 | 19.0    | 5    | 7.5              | 5    | 6.5  | 40.9 | 95      | 107   | 5    | 7    | 28.0    | 30.0 | 5         | 12                         | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 14               | 16 | 12 | 8  | 5             | 7.5  | 5       | 6.5  | 40.1 | 34.0  | 34.0    | 5    | 16   | 26.0 | 27.0    | 5    | 16   | 18.0 | 19.0    | 5    | 8                | 5    | 6.5  | 41.6 | 96      | 108   | 5    | 7.5  | 28.0    | 30.0 | 5         | 12                         | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



MoDOT

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
TRIPLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 5 FEET  
HEIGHT (HT): 7 THRU 8 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.87A

SHEET NO.  
5 OF 27

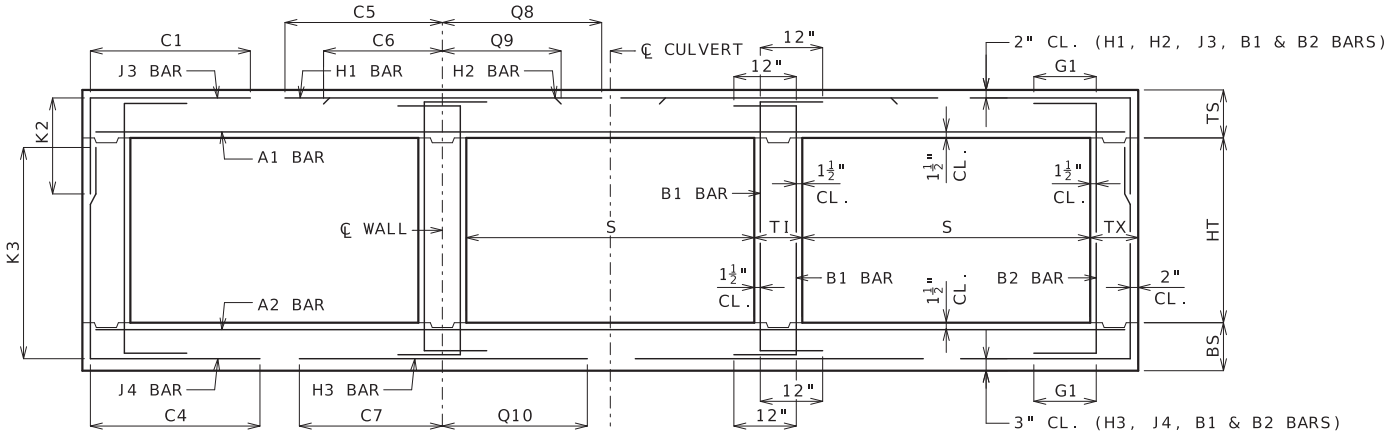
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| SPAN (S) = 6 FT |                  |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         |      |         |      | HEIGHT (HT) = 3 FT OR 4 FT OR 5 FT |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------|---------|------|------------------------------------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |      |         |      | WALL BARS                          |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |      | B2 BARS |      |                                    |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA. | C7      | Q10  | SIZE                               | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=3' | HT=4'   | HT=5' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=3' | HT=4' | HT=5' |         |      |         |      |                                    |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 11               | 8  | 8  | 8  | 5             | 8    | 4       | 9.5  | 37.5 | 27.0  | 27.0    | 27.0  | 4    | 17   | 64.5    | 48.5 | 4    | 17   | 24.0    | 23.0 | 4                | 10   | 4    | 10   | 38.1    | 40    | 52    | 64    | 4       | 7.5  | 33.0    | 34.0 | 5                                  | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 8  | 5             | 8    | 4       | 9.5  | 37.5 | 27.0  | 27.0    | 27.0  | 4    | 17   | 64.5    | 48.5 | 4    | 17   | 23.0    | 22.0 | 4                | 9.5  | 4    | 9    | 35.1    | 40    | 52    | 64    | 4       | 7    | 33.0    | 34.0 | 5                                  | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11               | 8  | 8  | 8  | 5             | 8    | 4       | 8.5  | 37.5 | 27.0  | 27.0    | 27.0  | 4    | 14   | 64.5    | 52.0 | 4    | 14   | 23.0    | 22.0 | 4                | 9    | 4    | 9    | 35.1    | 40    | 52    | 64    | 4       | 6.5  | 33.0    | 34.0 | 5                                  | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 7.5  | 4       | 8.5  | 35.8 | 24.0  | 24.0    | 24.0  | 4    | 14   | 43.0    | 52.0 | 4    | 14   | 21.0    | 21.0 | 4                | 9    | 4    | 9.5  | 32.1    | 40    | 52    | 64    | 4       | 6.5  | 32.0    | 33.0 | 5                                  | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 9    | 4       | 9.5  | 32.6 | 24.0  | 24.0    | 24.0  | 4    | 14   | 35.0    | 38.0 | 4    | 14   | 21.0    | 20.0 | 4                | 8.5  | 4    | 8.5  | 30.0    | 40    | 52    | 64    | 4       | 6    | 31.0    | 32.0 | 5                                  | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 9    | 4       | 9    | 30.4 | 24.0  | 24.0    | 24.0  | 4    | 13   | 33.0    | 35.0 | 4    | 13   | 20.0    | 20.0 | 4                | 8    | 4    | 8    | 29.0    | 40    | 52    | 64    | 5       | 7.5  | 30.0    | 32.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 8  | 4             | 8    | 4       | 8    | 29.4 | 24.0  | 24.0    | 24.0  | 4    | 12   | 32.0    | 34.0 | 4    | 12   | 20.0    | 20.0 | 4                | 7    | 4    | 7    | 28.4    | 40    | 52    | 64    | 5       | 6.5  | 30.0    | 32.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 9  | 8  | 8  | 4             | 7    | 4       | 7    | 28.8 | 24.0  | 24.0    | 24.0  | 5    | 17   | 31.0    | 33.0 | 5    | 17   | 20.0    | 20.0 | 4                | 6.5  | 4    | 9    | 27.4    | 41    | 53    | 65    | 5       | 7    | 30.0    | 32.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 9  | 8  | 8  | 4             | 6.5  | 4       | 6.5  | 28.3 | 24.0  | 24.0    | 24.0  | 5    | 16   | 31.0    | 32.0 | 5    | 16   | 21.0    | 21.0 | 5                | 9    | 4    | 8    | 26.9    | 41    | 53    | 65    | 5       | 6.5  | 30.0    | 32.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 9                | 10 | 8  | 8  | 4             | 6    | 4       | 7.5  | 27.6 | 25.0  | 25.0    | 25.0  | 5    | 16   | 30.0    | 33.0 | 5    | 16   | 20.0    | 20.0 | 5                | 9    | 4    | 9.5  | 26.5    | 42    | 54    | 66    | 5       | 7    | 29.0    | 32.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 9                | 10 | 8  | 8  | 5             | 9    | 4       | 6.5  | 27.4 | 25.0  | 25.0    | 25.0  | 5    | 16   | 30.0    | 32.0 | 5    | 16   | 21.0    | 21.0 | 5                | 8    | 4    | 8.5  | 26.3    | 42    | 54    | 66    | 5       | 6.5  | 29.0    | 32.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 10               | 11 | 8  | 8  | 5             | 9    | 4       | 7    | 27.0 | 26.0  | 26.0    | 26.0  | 5    | 15   | 30.0    | 33.0 | 5    | 15   | 20.0    | 20.0 | 5                | 8    | 4    | 8.5  | 26.0    | 43    | 55    | 67    | 5       | 7    | 29.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 10               | 11 | 8  | 8  | 5             | 8.5  | 4       | 6.5  | 26.0 | 26.0  | 26.0    | 26.0  | 5    | 15   | 29.0    | 32.0 | 5    | 15   | 20.0    | 20.0 | 5                | 7.5  | 4    | 8.5  | 25.0    | 43    | 55    | 67    | 5       | 7    | 29.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 11               | 12 | 8  | 8  | 5             | 8.5  | 4       | 6.5  | 25.8 | 27.0  | 27.0    | 27.0  | 5    | 15   | 29.0    | 32.0 | 5    | 15   | 20.0    | 20.0 | 5                | 8    | 4    | 8.5  | 24.9    | 44    | 56    | 68    | 5       | 7    | 29.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 11               | 12 | 8  | 8  | 5             | 7.5  | 4       | 6    | 25.6 | 27.0  | 27.0    | 27.0  | 5    | 14   | 29.0    | 32.0 | 5    | 14   | 20.0    | 20.0 | 5                | 6.5  | 4    | 8    | 24.9    | 44    | 56    | 68    | 5       | 6.5  | 29.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 12               | 13 | 8  | 8  | 5             | 7.5  | 4       | 6.5  | 25.5 | 28.0  | 28.0    | 28.0  | 5    | 14   | 29.0    | 32.0 | 5    | 14   | 19.0    | 20.0 | 5                | 7.5  | 4    | 8    | 24.9    | 45    | 57    | 69    | 5       | 7    | 29.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 12               | 14 | 8  | 8  | 5             | 7    | 4       | 6    | 25.6 | 28.0  | 28.0    | 28.0  | 5    | 13   | 29.0    | 32.0 | 5    | 13   | 19.0    | 20.0 | 5                | 7.5  | 4    | 7.5  | 24.8    | 46    | 58    | 70    | 5       | 7    | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 13               | 14 | 8  | 8  | 5             | 7    | 4       | 6    | 25.4 | 29.0  | 29.0    | 29.0  | 5    | 14   | 28.0    | 33.0 | 5    | 14   | 19.0    | 20.0 | 5                | 7    | 4    | 7.5  | 24.9    | 46    | 58    | 70    | 5       | 6.5  | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 13               | 15 | 8  | 8  | 5             | 7    | 5       | 8.5  | 25.6 | 29.0  | 29.0    | 29.0  | 5    | 13   | 28.0    | 32.0 | 5    | 13   | 19.0    | 20.0 | 5                | 7    | 4    | 7    | 24.8    | 47    | 59    | 71    | 5       | 7    | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 14               | 15 | 8  | 8  | 5             | 7    | 4       | 6    | 25.4 | 30.0  | 30.0    | 30.0  | 5    | 13   | 28.0    | 33.0 | 5    | 13   | 19.0    | 20.0 | 5                | 6.5  | 4    | 7    | 25.0    | 47    | 59    | 71    | 5       | 6.5  | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 14               | 16 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 25.5 | 30.0  | 30.0    | 30.0  | 5    | 13   | 28.0    | 32.0 | 5    | 13   | 19.0    | 20.0 | 5                | 7    | 4    | 6.5  | 24.9    | 48    | 60    | 72    | 5       | 6.5  | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 15               | 16 | 8  | 8  | 5             | 6.5  | 5       | 8    | 30.4 | 31.0  | 31.0    | 31.0  | 5    | 13   | 33.0    | 38.0 | 5    | 13   | 24.0    | 25.0 | 5                | 6.5  | 4    | 6.5  | 25.1    | 48    | 60    | 72    | 5       | 6.5  | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 15               | 17 | 8  | 8  | 5             | 6.5  | 5       | 8    | 30.6 | 31.0  | 31.0    | 31.0  | 5    | 12   | 33.0    | 37.0 | 5    | 12   | 24.0    | 25.0 | 5                | 6.5  | 4    | 6    | 25.1    | 49    | 61    | 73    | 5       | 6.5  | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 16               | 17 | 8  | 8  | 5             | 6.5  | 5       | 7    | 30.5 | 32.0  | 32.0    | 32.0  | 5    | 13   | 33.0    | 37.0 | 5    | 13   | 24.0    | 25.0 | 5                | 6.5  | 4    | 6    | 25.3    | 49    | 61    | 73    | 5       | 6    | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 16               | 17 | 8  | 8  | 5             | 6    | 5       | 7    | 30.5 | 32.0  | 32.0    | 32.0  | 5    | 12   | 33.0    | 37.0 | 5    | 12   | 24.0    | 25.0 | 5                | 6    | 4    | 6    | 25.3    | 49    | 61    | 73    | 5       | 6    | 28.0    | 33.0 | 5                                  | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 17               | 18 | 8  | 8  | 5             | 6    | 5       | 6.5  | 30.6 | 37.0  | 37.0    | 37.0  | 5    | 13   | 33.0    | 37.0 | 5    | 13   | 24.0    | 25.0 | 5                | 6    | 5    | 6.5  | 25.5    | 50    | 62    | 74    | 5       | 6    | 28.0    | 33.0 | 5                                  | 12   | 5    | 11   | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 17               | 18 | 8  | 8  | 5             | 6    | 5       | 6.5  | 30.6 | 37.0  | 37.0    | 37.0  | 5    | 12   | 33.0    | 37.0 | 5    | 12   | 24.0    | 25.0 | 5                | 6    | 5    | 6.5  | 25.4    | 50    | 62    | 74    | 5       | 6    | 28.0    | 33.0 | 5                                  | 12   | 5    | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 6 FT |                  |    |    |    |               |      |         |      |      |                   |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |                   |    |      |      | HEIGHT (HT) = 6 FT OR 7 FT |      |      |      |      |      |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------------------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|-------------------|----|------|------|----------------------------|------|------|------|------|------|----|----|-----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                   |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |                   |    |      |      |                            |      |      |      |      |      |    |    | WALL BARS |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                   | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS           |    |      |      |                            |      |      |      |      |      |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=6' HT=7' |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3<br>HT=6' HT=7' |    | SIZE | SPA. | C7                         | Q10  | SIZE | SPA. | SIZE | SPA. | G1 |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | 1 FT             | 11 | 8  | 8  | 8             | 5    | 8       | 4    | 9.5  | 37.5              | 27.0    | 27.0 | 4    | 17   | 64.5    | 48.5 | 4    | 17   | 24.0    | 24.0 | 4                | 9.5  | 4    | 7.5  | 52.8              | 76 | 88   | 4    | 7                          | 34.0 | 34.0 | 5    | 12   | 5    | 12 | 12 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 8  | 5             | 8    | 4       | 9.5  | 37.5 | 27.0              | 27.0    | 4    | 17   | 64.5 | 48.5    | 4    | 17   | 23.0 | 23.0    | 4    | 8.5              | 4    | 7    | 47.3 | 76                | 88 | 4    | 6.5  | 33.0                       | 34.0 | 5    | 12   | 5    | 12   | 12 |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 11               | 8  | 8  | 8  | 5             | 8    | 4       | 7    | 37.5 | 27.0              | 27.0    | 4    | 14   | 64.5 | 52.0    | 4    | 14   | 23.0 | 23.0    | 4    | 8.5              | 4    | 7    | 47.3 | 76                | 88 | 4    | 6.5  | 33.0                       | 34.0 | 5    | 12   | 5    | 12   | 12 |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 7    | 4       | 7    | 37.5 | 24.0              | 24.0    | 4    | 14   | 64.5 | 52.0    | 4    | 14   | 21.0 | 22.0    | 4    | 8.5              | 4    | 7    | 43.0 | 76                | 88 | 4    | 6.5  | 32.0                       | 34.0 | 5    | 12   | 5    | 12   | 12 |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 8.5  | 4       | 7.5  | 41.9 | 24.0              | 24.0    | 4    | 14   | 37.0 | 39.0    | 4    | 14   | 21.0 | 21.0    | 4    | 8                | 4    | 6.5  | 39.1 | 76                | 88 | 4    | 6    | 31.0                       | 33.0 | 5    | 12   | 5    | 12   | 12 |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 8.5  | 4       | 7    | 37.6 | 24.0              | 24.0    | 4    | 13   | 34.0 | 35.0    | 4    | 13   | 20.0 | 20.0    | 4    | 7.5              | 4    | 6    | 36.9 | 76                | 88 | 5    | 7    | 30.0                       | 32.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 8  | 8  | 8  | 4             | 8    | 4       | 6    | 36.0 | 24.0              | 24.0    | 4    | 12   | 32.0 | 34.0    | 4    | 12   | 20.0 | 20.0    | 4    | 6.5              | 5    | 6    | 35.4 | 76                | 88 | 5    | 6.5  | 30.0                       | 32.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 9  | 8  | 8  | 4             | 7    | 5       | 6.5  | 34.8 | 24.0              | 24.0    | 5    | 17   | 31.0 | 33.0    | 5    | 17   | 20.0 | 20.0    | 4    | 6.5              | 4    | 6    | 35.0 | 77                | 89 | 5    | 7    | 30.0                       | 32.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 9  | 8  | 8  | 4             | 6    | 5       | 6    | 33.9 | 24.0              | 28.0    | 5    | 16   | 31.0 | 33.0    | 5    | 16   | 21.0 | 21.0    | 5    | 8.5              | 5    | 6.5  | 34.1 | 77                | 89 | 5    | 6.5  | 30.0                       | 32.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 9                | 10 | 8  | 8  | 4             | 6    | 5       | 6.5  | 33.8 | 25.0              | 25.0    | 5    | 16   | 30.0 | 33.0    | 5    | 16   | 20.0 | 20.0    | 5    | 9                | 4    | 6    | 34.0 | 78                | 90 | 5    | 7    | 29.0                       | 33.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 9                | 10 | 8  | 8  | 5             | 9    | 5       | 6.5  | 33.4 | 25.0              | 29.0    | 5    | 16   | 30.0 | 32.0    | 5    | 16   | 21.0 | 21.0    | 5    | 8                | 5    | 6.5  | 33.6 | 78                | 90 | 5    | 6.5  | 29.0                       | 32.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 9                | 11 | 8  | 8  | 5             | 8    | 5       | 6    | 33.1 | 25.0              | 29.0    | 5    | 16   | 30.0 | 32.0    | 5    | 16   | 21.0 | 22.0    | 5    | 8                | 5    | 7    | 33.8 | 79                | 91 | 5    | 7.5  | 29.0                       | 33.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 10               | 11 | 8  | 8  | 5             | 8.5  | 5       | 7    | 31.6 | 26.0              | 30.0    | 5    | 15   | 29.0 | 32.0    | 5    | 15   | 20.0 | 20.0    | 5    | 7.5              | 5    | 7    | 31.9 | 79                | 91 | 5    | 7    | 29.0                       | 33.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 10               | 12 | 8  | 8  | 5             | 7.5  | 5       | 6.5  | 31.6 | 26.0              | 30.0    | 5    | 15   | 29.0 | 32.0    | 5    | 15   | 20.0 | 21.0    | 5    | 8                | 5    | 7.5  | 32.0 | 80                | 92 | 5    | 7    | 29.0                       | 33.0 | 5    | 12   | 5    | 12   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 11               | 13 | 8  | 8  | 5             | 8    | 5       | 6.5  | 31.9 | 27.0              | 31.0    | 5    | 14   | 29.0 | 32.0    | 5    | 14   | 20.0 | 20.0    | 5    | 8                | 5    | 7.5  | 32.3 | 81                | 93 | 5    | 7.5  | 29.0                       | 33.0 | 5    | 12   | 5    | 11   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 12               | 13 | 8  | 8  | 5             | 8    | 5       | 7    | 31.9 | 28.0              | 32.0    | 5    | 14   | 29.0 | 32.0    | 5    | 14   | 19.0 | 20.0    | 5    | 7.5              | 5    | 7    | 32.3 | 81                | 93 | 5    | 7    | 29.0                       | 33.0 | 5    | 12   | 5    | 10   | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 12               | 14 | 8  | 8  | 5             | 7.5  | 5       | 6.5  | 32.0 | 28.0              | 32.0    | 5    | 13   | 29.0 | 32.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7.5              | 5    | 7.5  | 32.4 | 82                | 94 | 5    | 7    | 29.0                       | 33.0 | 5    | 12   | 5    | 9.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 13               | 14 | 8  | 8  | 5             | 7.5  | 5       | 6.5  | 32.0 | 33.0              | 33.0    | 5    | 14   | 28.0 | 32.0    | 5    | 14   | 19.0 | 20.0    | 5    | 7                | 5    | 7    | 32.5 | 82                | 94 | 5    | 6.5  | 29.0                       | 33.0 | 5    | 12   | 5    | 9.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 13               | 15 | 8  | 8  | 5             | 7    | 5       | 6.5  | 32.1 | 33.0              | 33.0    | 5    | 13   | 28.0 | 32.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7                | 5    | 7    | 32.6 | 83                | 95 | 5    | 7    | 29.0                       | 33.0 | 5    | 12   | 5    | 9.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 14               | 15 | 8  | 8  | 5             | 7    | 5       | 6    | 32.3 | 34.0              | 34.0    | 5    | 14   | 28.0 | 32.0    | 5    | 14   | 19.0 | 20.0    | 5    | 7                | 5    | 6.5  | 32.8 | 83                | 95 | 5    | 6.5  | 29.0                       | 33.0 | 5    | 12   | 5    | 9.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 14               | 16 | 9  | 8  | 5             | 6.5  | 5       | 7    | 32.9 | 30.0              | 34.0    | 5    | 13   | 28.0 | 32.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7                | 5    | 8    | 33.1 | 84                | 96 | 5    | 6.5  | 29.0                       | 33.0 | 5    | 12   | 5    | 8.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 14               | 16 | 10 | 8  | 5             | 6    | 5       | 7.5  | 33.3 | 30.0              | 34.0    | 5    | 12   | 28.0 | 32.0    | 5    | 12   | 19.0 | 20.0    | 5    | 6.5              | 5    | 7.5  | 33.4 | 84                | 96 | 5    | 6.5  | 29.0                       | 33.0 | 5    | 12   | 5    | 9.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 15               | 17 | 10 | 8  | 5             | 6.5  | 5       | 7.5  | 38.5 | 31.0              | 35.0    | 5    | 13   | 33.0 | 37.0    | 5    | 13   | 24.0 | 25.0    | 5    | 7                | 5    | 7.5  | 33.6 | 85                | 97 | 5    | 6.5  | 29.0                       | 33.0 | 5    | 12   | 5    | 9    | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 15               | 17 | 10 | 8  | 5             | 6.5  | 5       | 7.5  | 38.5 | 31.0              | 35.0    | 5    | 12   | 33.0 | 37.0    | 5    | 12   | 24.0 | 25.0    | 5    | 6.5              | 5    | 7.5  | 33.6 | 85                | 97 | 5    | 6    | 29.0                       | 33.0 | 5    | 12   | 5    | 8.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 16               | 17 | 10 | 8  | 5             | 6.5  | 5       | 7    | 38.6 | 32.0              | 36.0    | 5    | 13   | 33.0 | 36.0    | 5    | 13   | 24.0 | 25.0    | 5    | 6                | 5    | 7.5  | 33.8 | 85                | 97 | 5    | 6    | 29.0                       | 33.0 | 5    | 12   | 5    | 8    | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 16               | 18 | 11 | 8  | 5             | 6    | 5       | 7    | 39.3 | 32.0              | 36.0    | 5    | 12   | 33.0 | 36.0    | 5    | 12   | 24.0 | 25.0    | 5    | 6.5              | 5    | 7.5  | 34.1 | 86                | 98 | 5    | 6    | 29.0                       | 34.0 | 5    | 12   | 5    | 8.5  | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 17               | 18 | 11 | 8  | 5             | 6    | 5       | 7    | 39.4 | 33.0              | 37.0    | 5    | 13   | 33.0 | 36.0    | 5    | 13   | 24.0 | 25.0    | 5    | 6                | 5    | 7.5  | 34.3 | 86                | 98 | 5    | 6    | 29.0                       | 33.0 | 5    | 12   | 5    | 8    | 0  |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 6 FT |                  |    |    |    |               |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |      |      |         |      |           | HEIGHT (HT) = 8 FT OR 9 FT |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|------|------|---------|------|-----------|----------------------------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |      |      |         |      | WALL BARS |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |      |      | B1 BARS |      | B2 BARS   |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |       | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                       | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=8' | HT=9'   |      |      |      |         |      |      |      |         |      |                  |      |      |      | HT=8'   | HT=9' |      |      |         |      |           |                            |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 11               | 8  | 8  | 8  | 5             | 7.5  | 4       | 7    | 37.5 | 27.0  | 27.0    | 4    | 17   | 64.5 | 48.5    | 4    | 17   | 24.0 | 25.0    | 4    | 8.5              | 5    | 6.5  | 54.0 | 100     | 112   | 4    | 7    | 52.0    | 35.0 | 5         | 12                         | 5    | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 11               | 8  | 8  | 8  | 5             | 7.5  | 4       | 6.5  | 37.5 | 27.0  | 27.0    | 4    | 17   | 64.5 | 48.5    | 4    | 17   | 23.0 | 24.0    | 4    | 8                | 5    | 6    | 54.0 | 100     | 112   | 4    | 6.5  | 35.0    | 34.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 11               | 8  | 8  | 8  | 5             | 7.5  | 4       | 6    | 38.1 | 27.0  | 27.0    | 4    | 14   | 64.5 | 52.0    | 4    | 14   | 23.0 | 24.0    | 4    | 8                | 5    | 6    | 54.8 | 100     | 112   | 4    | 6    | 35.0    | 34.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 9  | 8  | 4             | 7    | 4       | 6    | 38.1 | 24.0  | 24.0    | 4    | 14   | 64.5 | 52.0    | 4    | 14   | 22.0 | 22.0    | 4    | 8                | 5    | 6.5  | 54.8 | 100     | 112   | 4    | 6    | 33.0    | 34.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 9  | 8  | 4             | 8.5  | 4       | 6    | 38.1 | 24.0  | 24.0    | 4    | 14   | 64.5 | 40.0    | 4    | 14   | 21.0 | 21.0    | 4    | 8                | 5    | 6    | 50.8 | 100     | 112   | 4    | 6    | 32.0    | 33.0 | 5         | 12                         | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 9  | 9  | 8  | 4             | 8.5  | 4       | 6    | 50.1 | 24.0  | 24.0    | 4    | 14   | 35.0 | 35.0    | 4    | 14   | 20.0 | 20.0    | 4    | 8.5              | 5    | 6.5  | 50.8 | 101     | 113   | 4    | 6.5  | 31.0    | 33.0 | 5         | 12                         | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 9  | 9  | 8  | 4             | 8    | 5       | 6.5  | 45.8 | 24.0  | 28.0    | 4    | 12   | 33.0 | 33.0    | 4    | 12   | 20.0 | 20.0    | 4    | 7.5              | 5    | 6    | 47.5 | 101     | 113   | 4    | 6    | 31.0    | 33.0 | 5         | 12                         | 5    | 11   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 9  | 10 | 8  | 4             | 7    | 5       | 6.5  | 43.0 | 24.0  | 28.0    | 5    | 17   | 32.0 | 33.0    | 5    | 17   | 20.0 | 20.0    | 4    | 6.5              | 5    | 6.5  | 44.8 | 101     | 113   | 5    | 7    | 30.0    | 32.0 | 5         | 12                         | 5    | 11   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 8                | 9  | 10 | 8  | 4             | 6.5  | 5       | 6    | 41.6 | 28.0  | 28.0    | 5    | 17   | 31.0 | 32.0    | 5    | 17   | 21.0 | 21.0    | 4    | 6                | 5    | 6    | 43.5 | 101     | 113   | 5    | 6.5  | 30.0    | 32.0 | 5         | 12                         | 5    | 10   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 8                | 10 | 10 | 8  | 4             | 6    | 6       | 7    | 43.3 | 28.0  | 28.0    | 5    | 16   | 30.0 | 32.0    | 5    | 16   | 22.0 | 22.0    | 5    | 9                | 5    | 6    | 44.4 | 102     | 114   | 5    | 7    | 30.0    | 33.0 | 5         | 12                         | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 9                | 10 | 10 | 8  | 4             | 6    | 5       | 6    | 41.8 | 29.0  | 29.0    | 5    | 16   | 30.0 | 32.0    | 5    | 16   | 20.0 | 21.0    | 5    | 8.5              | 6    | 7.5  | 46.4 | 102     | 114   | 5    | 7    | 30.0    | 32.0 | 5         | 12                         | 5    | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 9                | 11 | 10 | 8  | 5             | 8.5  | 5       | 6    | 41.0 | 29.0  | 29.0    | 5    | 16   | 30.0 | 32.0    | 5    | 16   | 21.0 | 22.0    | 5    | 8.5              | 5    | 6    | 44.4 | 103     | 115   | 5    | 7    | 30.0    | 33.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 10               | 11 | 10 | 8  | 5             | 9    | 5       | 6.5  | 39.9 | 30.0  | 30.0    | 5    | 15   | 29.0 | 32.0    | 5    | 15   | 20.0 | 20.0    | 5    | 8                | 5    | 6    | 41.4 | 103     | 115   | 5    | 7    | 30.0    | 33.0 | 5         | 12                         | 5    | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 10               | 12 | 10 | 8  | 5             | 8    | 5       | 6.5  | 39.5 | 30.0  | 30.0    | 5    | 15   | 29.0 | 32.0    | 5    | 15   | 20.0 | 21.0    | 5    | 8                | 5    | 6    | 42.3 | 104     | 116   | 5    | 7    | 30.0    | 33.0 | 5         | 12                         | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 11               | 12 | 10 | 8  | 5             | 8    | 5       | 6    | 40.5 | 31.0  | 31.0    | 5    | 14   | 29.0 | 32.0    | 5    | 14   | 19.0 | 20.0    | 5    | 7                | 5    | 6    | 41.9 | 104     | 116   | 5    | 6.5  | 30.0    | 33.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 11               | 13 | 10 | 8  | 5             | 7.5  | 5       | 6    | 40.3 | 31.0  | 31.0    | 5    | 14   | 29.0 | 32.0    | 5    | 14   | 20.0 | 20.0    | 5    | 7.5              | 5    | 6    | 42.8 | 105     | 117   | 5    | 7    | 30.0    | 33.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 12               | 14 | 10 | 8  | 5             | 8    | 5       | 6    | 41.0 | 32.0  | 32.0    | 5    | 14   | 29.0 | 31.0    | 5    | 14   | 19.0 | 20.0    | 5    | 8                | 5    | 6    | 43.3 | 106     | 118   | 5    | 7    | 30.0    | 33.0 | 5         | 12                         | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 12               | 14 | 11 | 8  | 5             | 7.5  | 5       | 6.5  | 40.8 | 32.0  | 32.0    | 5    | 13   | 29.0 | 31.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7.5              | 5    | 7    | 42.9 | 106     | 118   | 5    | 6.5  | 30.0    | 33.0 | 5         | 12                         | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 13               | 15 | 11 | 8  | 5             | 7.5  | 5       | 6.5  | 41.5 | 33.0  | 33.0    | 5    | 13   | 28.0 | 31.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7.5              | 5    | 7    | 43.5 | 107     | 119   | 5    | 7    | 30.0    | 33.0 | 5         | 12                         | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 13               | 15 | 11 | 8  | 5             | 7    | 5       | 6    | 41.4 | 33.0  | 33.0    | 5    | 13   | 28.0 | 31.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7                | 5    | 6.5  | 43.4 | 107     | 119   | 5    | 6.5  | 30.0    | 33.0 | 5         | 12                         | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 14               | 16 | 12 | 8  | 5             | 7    | 5       | 6.5  | 42.1 | 34.0  | 34.0    | 5    | 13   | 28.0 | 31.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7                | 5    | 6.5  | 43.8 | 108     | 120   | 5    | 6.5  | 30.0    | 33.0 | 5         | 12                         | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 14               | 16 | 12 | 8  | 5             | 7    | 5       | 6    | 42.0 | 34.0  | 34.0    | 5    | 13   | 28.0 | 31.0    | 5    | 13   | 19.0 | 20.0    | 5    | 7                | 5    | 6.5  | 43.6 | 108     | 120   | 5    | 6.5  | 30.0    | 33.0 | 5         | 12                         | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 15               | 17 | 12 | 8  | 5             | 7    | 5       | 6    | 47.6 | 35.0  | 35.0    | 5    | 13   | 33.0 | 36.0    | 5    | 13   | 24.0 | 25.0    | 5    | 7                | 5    | 6.5  | 44.3 | 109     | 121   | 5    | 6.5  | 30.0    | 33.0 | 5         | 12                         | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 15               | 17 | 13 | 8  | 5             | 6.5  | 5       | 6    | 47.6 | 35.0  | 35.0    | 5    | 13   | 33.0 | 36.0    | 5    | 13   | 24.0 | 25.0    | 5    | 6.5              | 5    | 6    | 44.0 | 109     | 121   | 5    | 6    | 30.0    | 33.0 | 5         | 12                         | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 15               | 17 | 13 | 8  | 5             | 6    | 5       | 6    | 47.6 | 35.0  | 35.0    | 5    | 12   | 33.0 | 36.0    | 5    | 12   | 24.0 | 25.0    | 5    | 6                | 5    | 6    | 43.9 | 109     | 121   | 5    | 6    | 30.0    | 33.0 | 5         | 12                         | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 16               | 18 | 13 | 8  | 5             | 6.5  | 5       | 6    | 48.3 | 36.0  | 36.0    | 5    | 13   | 33.0 | 35.0    | 5    | 13   | 24.0 | 25.0    | 5    | 6.5              | 5    | 6    | 44.5 | 110     | 122   | 5    | 6    | 30.0    | 33.0 | 5         | 12                         | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 16               | 18 | 14 | 8  | 5             | 6    | 5       | 6    | 48.3 | 36.0  | 36.0    | 5    | 12   | 33.0 | 35.0    | 5    | 12   | 24.0 | 25.0    | 5    | 6                | 5    | 6    | 44.3 | 110     | 122   | 6    | 8.5  | 32.0    | 37.0 | 5         | 12                         | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.





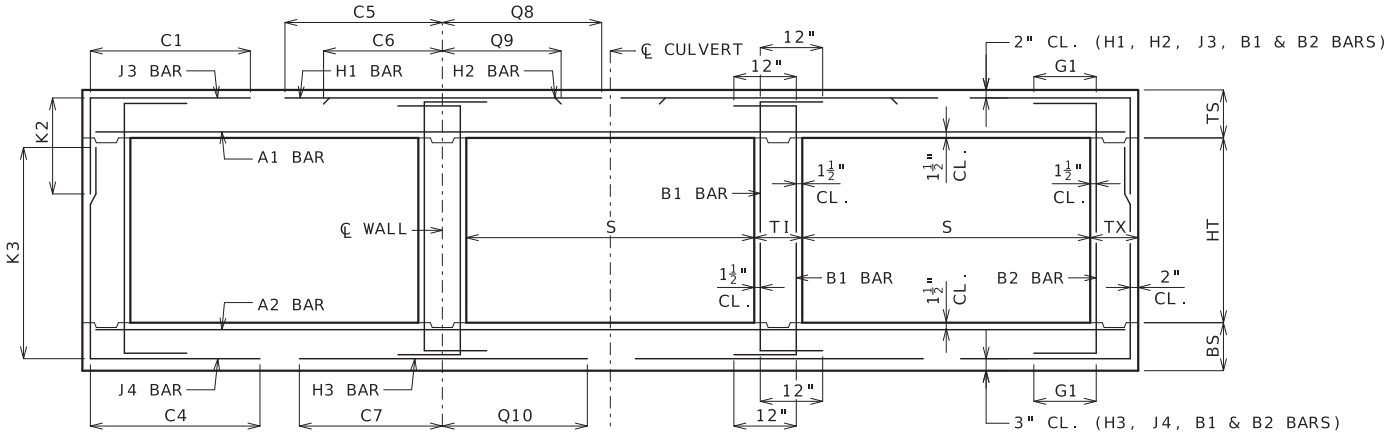
| SPAN (S) = 7 FT |                  |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         | HEIGHT (HT) = 4 FT OR 5 FT OR 6 FT |           |      |      |      |      |      |    |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------------------------------------|-----------|------|------|------|------|------|----|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |                                    | WALL BARS |      |      |      |      |      |    |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |                                    | B2 BARS   |      |      |      |      |      |    |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA.                               | C7        | Q10  | SIZE | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=4' | HT=5'   | HT=6' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=4' | HT=5' | HT=6' |         |                                    |           |      |      |      |      |      |    |  |  |  |  |  |  |  |
| 1 FT            | 12               | 8  | 8  | 8  | 5             | 7.5  | 4       | 8.5  | 41.1 | 28.0  | 28.0    | 28.0  | 4    | 16   | 72.5    | 54.5 | 4    | 16   | 25.0    | 25.0 | 4                | 8.5  | 4    | 7.5  | 42.5    | 52    | 64    | 76    | 4       | 6                                  | 36.0      | 37.0 | 5    | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 2 FT            | 12               | 8  | 8  | 8  | 5             | 7.5  | 4       | 8.5  | 41.1 | 28.0  | 28.0    | 28.0  | 4    | 15   | 72.5    | 54.5 | 4    | 15   | 24.0    | 24.0 | 4                | 7.5  | 4    | 7    | 39.0    | 52    | 64    | 76    | 5       | 7.5                                | 35.0      | 37.0 | 5    | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 2' - 4'         | 12               | 8  | 8  | 8  | 5             | 7.5  | 4       | 6.5  | 41.1 | 28.0  | 28.0    | 28.0  | 5    | 17   | 72.5    | 58.0 | 5    | 17   | 24.0    | 24.0 | 4                | 7    | 4    | 7    | 39.0    | 52    | 64    | 76    | 5       | 7                                  | 35.0      | 37.0 | 5    | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 6    | 4       | 6.5  | 39.5 | 24.0  | 24.0    | 24.0  | 5    | 17   | 47.0    | 58.0 | 5    | 17   | 23.0    | 23.0 | 4                | 7    | 4    | 7    | 36.0    | 52    | 64    | 76    | 5       | 7                                  | 35.0      | 37.0 | 5    | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 6.5  | 4       | 7    | 36.0 | 24.0  | 24.0    | 24.0  | 5    | 17   | 38.0    | 42.0 | 5    | 17   | 22.0    | 22.0 | 4                | 6.5  | 4    | 6.5  | 33.4    | 52    | 64    | 76    | 5       | 6.5                                | 34.0      | 36.0 | 5    | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 8 FT            | 8                | 8  | 8  | 8  | 4             | 6.5  | 4       | 6.5  | 33.5 | 24.0  | 24.0    | 24.0  | 5    | 17   | 36.0    | 38.0 | 5    | 17   | 23.0    | 22.0 | 5                | 9    | 4    | 6    | 32.0    | 52    | 64    | 76    | 5       | 6                                  | 33.0      | 35.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 10 FT           | 8                | 9  | 8  | 8  | 4             | 6    | 5       | 7    | 32.3 | 24.0  | 24.0    | 24.0  | 5    | 16   | 35.0    | 37.0 | 5    | 16   | 23.0    | 23.0 | 5                | 9    | 4    | 7    | 30.9    | 53    | 65    | 77    | 5       | 6.5                                | 33.0      | 35.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 12 FT           | 8                | 9  | 8  | 8  | 4             | 6    | 5       | 6    | 31.4 | 24.0  | 24.0    | 24.0  | 5    | 14   | 34.0    | 36.0 | 5    | 14   | 23.0    | 23.0 | 5                | 7.5  | 4    | 6    | 30.1    | 53    | 65    | 77    | 5       | 6                                  | 32.0      | 35.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 14 FT           | 9                | 10 | 8  | 8  | 5             | 8.5  | 4       | 6    | 30.5 | 25.0  | 25.0    | 25.0  | 5    | 15   | 33.0    | 36.0 | 5    | 15   | 23.0    | 23.0 | 5                | 7.5  | 4    | 7    | 29.5    | 54    | 66    | 78    | 5       | 6                                  | 32.0      | 36.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 16 FT           | 10               | 11 | 8  | 8  | 5             | 8    | 5       | 8    | 29.9 | 26.0  | 26.0    | 26.0  | 5    | 15   | 33.0    | 36.0 | 5    | 15   | 22.0    | 22.0 | 5                | 7.5  | 4    | 7    | 29.0    | 55    | 67    | 79    | 5       | 6.5                                | 32.0      | 36.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 18 FT           | 10               | 11 | 8  | 8  | 5             | 8    | 5       | 7.5  | 29.5 | 26.0  | 26.0    | 26.0  | 5    | 15   | 33.0    | 36.0 | 5    | 15   | 23.0    | 24.0 | 5                | 6    | 4    | 6.5  | 28.6    | 55    | 67    | 79    | 5       | 6                                  | 32.0      | 36.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 20 FT           | 11               | 12 | 8  | 8  | 5             | 7.5  | 5       | 8.5  | 29.1 | 27.0  | 27.0    | 27.0  | 5    | 14   | 32.0    | 36.0 | 5    | 14   | 22.0    | 23.0 | 5                | 6.5  | 4    | 6.5  | 28.4    | 56    | 68    | 80    | 5       | 6                                  | 31.0      | 36.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 22 FT           | 12               | 13 | 8  | 8  | 5             | 7    | 5       | 8.5  | 28.9 | 28.0  | 28.0    | 28.0  | 5    | 13   | 32.0    | 36.0 | 5    | 13   | 21.0    | 22.0 | 5                | 6.5  | 4    | 6    | 28.3    | 57    | 69    | 81    | 5       | 6                                  | 31.0      | 36.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 24 FT           | 12               | 13 | 8  | 8  | 5             | 7    | 5       | 8.5  | 27.6 | 28.0  | 28.0    | 28.0  | 5    | 13   | 31.0    | 36.0 | 5    | 13   | 21.0    | 22.0 | 5                | 6    | 4    | 6    | 27.1    | 57    | 69    | 81    | 6       | 8                                  | 34.0      | 39.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 26 FT           | 13               | 14 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 27.5 | 29.0  | 29.0    | 29.0  | 5    | 12   | 31.0    | 36.0 | 5    | 12   | 20.0    | 21.0 | 5                | 6.5  | 4    | 6    | 27.1    | 58    | 70    | 82    | 5       | 6                                  | 31.0      | 36.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 28 FT           | 13               | 15 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 27.6 | 29.0  | 29.0    | 29.0  | 5    | 12   | 31.0    | 36.0 | 5    | 12   | 21.0    | 22.0 | 5                | 6.5  | 4    | 6.5  | 27.0    | 59    | 71    | 83    | 5       | 6                                  | 31.0      | 37.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 30 FT           | 14               | 15 | 8  | 8  | 5             | 6    | 5       | 8.5  | 27.5 | 30.0  | 30.0    | 34.0  | 5    | 12   | 31.0    | 36.0 | 5    | 12   | 20.0    | 21.0 | 5                | 6    | 5    | 8.5  | 27.1    | 59    | 71    | 83    | 6       | 8                                  | 34.0      | 39.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 32 FT           | 15               | 16 | 8  | 8  | 5             | 6    | 5       | 8    | 32.5 | 31.0  | 31.0    | 35.0  | 6    | 17   | 39.0    | 45.0 | 6    | 17   | 29.0    | 30.0 | 5                | 6    | 5    | 8    | 27.3    | 60    | 72    | 84    | 6       | 8                                  | 34.0      | 40.0 | 5    | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 34 FT           | 15               | 17 | 8  | 8  | 5             | 6    | 5       | 8    | 32.6 | 31.0  | 31.0    | 31.0  | 6    | 16   | 39.0    | 45.0 | 6    | 16   | 29.0    | 30.0 | 5                | 6    | 4    | 6    | 27.3    | 61    | 73    | 85    | 6       | 8.5                                | 34.0      | 40.0 | 5    | 12   | 5    | 11.5 | 0  |  |  |  |  |  |  |  |
| 36 FT           | 16               | 17 | 8  | 8  | 5             | 6    | 5       | 7    | 32.5 | 32.0  | 32.0    | 36.0  | 6    | 16   | 39.0    | 45.0 | 6    | 16   | 29.0    | 30.0 | 6                | 8.5  | 5    | 7    | 27.4    | 61    | 73    | 85    | 6       | 8                                  | 34.0      | 40.0 | 5    | 12   | 5    | 11   | 0  |  |  |  |  |  |  |  |
| 38 FT           | 16               | 18 | 8  | 8  | 6             | 8    | 5       | 7    | 32.6 | 32.0  | 36.0    | 36.0  | 6    | 15   | 39.0    | 45.0 | 6    | 15   | 29.0    | 30.0 | 5                | 6    | 5    | 6.5  | 27.4    | 62    | 74    | 86    | 6       | 8                                  | 34.0      | 40.0 | 5    | 12   | 5    | 10   | 0  |  |  |  |  |  |  |  |
| 40 FT           | 17               | 18 | 8  | 8  | 6             | 8    | 5       | 6.5  | 32.6 | 37.0  | 37.0    | 37.0  | 6    | 16   | 39.0    | 45.0 | 6    | 16   | 29.0    | 30.0 | 6                | 8    | 5    | 6.5  | 27.6    | 62    | 74    | 86    | 6       | 7.5                                | 34.0      | 40.0 | 5    | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 42 FT           | 17               | 19 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 32.8 | 37.0  | 37.0    | 37.0  | 6    | 15   | 39.0    | 45.0 | 6    | 15   | 29.0    | 30.0 | 6                | 8    | 5    | 6.5  | 27.6    | 63    | 75    | 87    | 6       | 8                                  | 34.0      | 40.0 | 5    | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 44 FT           | 18               | 19 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 32.6 | 38.0  | 38.0    | 38.0  | 6    | 15   | 39.0    | 45.0 | 6    | 15   | 29.0    | 30.0 | 6                | 7.5  | 5    | 6.5  | 27.8    | 63    | 75    | 87    | 6       | 7.5                                | 34.0      | 40.0 | 5    | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 46 FT           | 18               | 20 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 32.8 | 38.0  | 38.0    | 38.0  | 6    | 15   | 39.0    | 44.0 | 6    | 15   | 29.0    | 30.0 | 6                | 8    | 5    | 6    | 27.8    | 64    | 76    | 88    | 6       | 7.5                                | 34.0      | 40.0 | 5    | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 48 FT           | 19               | 20 | 8  | 8  | 6             | 7.5  | 5       | 6    | 32.8 | 39.0  | 39.0    | 39.0  | 6    | 15   | 39.0    | 44.0 | 6    | 15   | 29.0    | 30.0 | 6                | 7.5  | 5    | 6    | 27.9    | 64    | 76    | 88    | 6       | 7                                  | 34.0      | 40.0 | 5    | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 50 FT           | 19               | 21 | 8  | 8  | 6             | 7    | 5       | 6    | 32.9 | 39.0  | 39.0    | 39.0  | 6    | 14   | 39.0    | 44.0 | 6    | 14   | 29.0    | 30.0 | 6                | 7.5  | 6    | 7.5  | 31.0    | 65    | 77    | 89    | 6       | 7.5                                | 34.0      | 40.0 | 5    | 12   | 5    | 9    | 0  |  |  |  |  |  |  |  |

| SPAN (S) = 7 FT |                  |    |    |    |               |      |         |      |      |                   |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |                   |     |      | HEIGHT (HT) = 7 FT OR 8 FT |      |      |      |      |           |      |    |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------------------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|-------------------|-----|------|----------------------------|------|------|------|------|-----------|------|----|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                   |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |                   |     |      |                            |      |      |      |      | WALL BARS |      |    |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                   | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS           |     |      |                            |      |      |      |      |           |      |    |  |  |  |  |
|                 | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=7' HT=8' |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3<br>HT=7' HT=8' |     | SIZE | SPA.                       | C7   | Q10  | SIZE | SPA. | B2 BARS   | G1   |    |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      |                   |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |                   |     |      |                            |      |      |      |      |           |      |    |  |  |  |  |
| 1 FT            | 12               | 8  | 8  | 8  | 5             | 7.5  | 4       | 8    | 41.1 | 28.0              | 28.0    | 4    | 16   | 72.5 | 54.5    | 4    | 16   | 25.0 | 26.0    | 4    | 8                | 4    | 6    | 57.4 | 88                | 100 | 4    | 6                          | 37.0 | 37.0 | 5    | 12   | 5         | 12   | 12 |  |  |  |  |
| 2 FT            | 12               | 8  | 8  | 8  | 5             | 7.5  | 4       | 7.5  | 41.1 | 28.0              | 28.0    | 4    | 15   | 72.5 | 54.5    | 4    | 15   | 25.0 | 25.0    | 4    | 7                | 5    | 6.5  | 51.3 | 88                | 100 | 5    | 7                          | 36.0 | 37.0 | 5    | 12   | 5         | 12   | 12 |  |  |  |  |
| 2'- 4'          | 12               | 8  | 9  | 8  | 5             | 7.5  | 4       | 6    | 41.8 | 28.0              | 28.0    | 5    | 17   | 73.5 | 58.0    | 5    | 17   | 25.0 | 25.0    | 4    | 7                | 5    | 6.5  | 51.3 | 88                | 100 | 5    | 7                          | 36.0 | 37.0 | 5    | 12   | 5         | 12   | 12 |  |  |  |  |
| 4 FT            | 8                | 8  | 9  | 8  | 4             | 6    | 4       | 6    | 41.8 | 24.0              | 24.0    | 5    | 17   | 73.5 | 58.0    | 5    | 17   | 23.0 | 23.0    | 4    | 7                | 4    | 6.5  | 45.9 | 88                | 100 | 5    | 7                          | 35.0 | 37.0 | 5    | 12   | 5         | 12   | 12 |  |  |  |  |
| 6 FT            | 8                | 8  | 9  | 8  | 4             | 6.5  | 4       | 6    | 44.3 | 24.0              | 24.0    | 5    | 17   | 40.0 | 43.0    | 5    | 17   | 22.0 | 22.0    | 4    | 6.5              | 5    | 6.5  | 41.8 | 88                | 100 | 5    | 6.5                        | 34.0 | 36.0 | 5    | 12   | 5         | 12   | 12 |  |  |  |  |
| 8 FT            | 8                | 8  | 9  | 8  | 4             | 6.5  | 4       | 6    | 40.9 | 24.0              | 24.0    | 5    | 17   | 37.0 | 38.0    | 5    | 17   | 22.0 | 23.0    | 5    | 9                | 5    | 6    | 39.9 | 88                | 100 | 5    | 6                          | 33.0 | 35.0 | 5    | 12   | 5         | 12   | 0  |  |  |  |  |
| 10 FT           | 8                | 9  | 9  | 8  | 4             | 6    | 5       | 6.5  | 39.1 | 24.0              | 28.0    | 5    | 16   | 35.0 | 37.0    | 5    | 16   | 23.0 | 23.0    | 5    | 9                | 5    | 7    | 39.4 | 89                | 101 | 5    | 6.5                        | 33.0 | 36.0 | 5    | 12   | 5         | 12   | 0  |  |  |  |  |
| 12 FT           | 8                | 9  | 9  | 8  | 4             | 6    | 6       | 7    | 41.0 | 24.0              | 28.0    | 5    | 15   | 34.0 | 36.0    | 5    | 15   | 23.0 | 24.0    | 5    | 7                | 5    | 6    | 38.3 | 89                | 101 | 5    | 6                          | 32.0 | 35.0 | 5    | 12   | 5         | 12   | 0  |  |  |  |  |
| 14 FT           | 9                | 10 | 9  | 8  | 5             | 8.5  | 5       | 6    | 37.8 | 25.0              | 29.0    | 5    | 15   | 34.0 | 36.0    | 5    | 15   | 23.0 | 23.0    | 5    | 7.5              | 5    | 6.5  | 37.9 | 90                | 102 | 5    | 6                          | 32.0 | 36.0 | 5    | 12   | 5         | 12   | 0  |  |  |  |  |
| 16 FT           | 10               | 11 | 9  | 8  | 5             | 8    | 5       | 7    | 37.4 | 26.0              | 30.0    | 5    | 15   | 33.0 | 36.0    | 5    | 15   | 22.0 | 22.0    | 5    | 7.5              | 5    | 7    | 37.6 | 91                | 103 | 5    | 6.5                        | 32.0 | 36.0 | 5    | 12   | 5         | 12   | 0  |  |  |  |  |
| 18 FT           | 10               | 11 | 9  | 8  | 5             | 8    | 5       | 6.5  | 36.8 | 30.0              | 30.0    | 5    | 15   | 33.0 | 36.0    | 5    | 15   | 23.0 | 23.0    | 5    | 6                | 5    | 6.5  | 36.9 | 91                | 103 | 5    | 6                          | 32.0 | 36.0 | 5    | 12   | 5         | 12   | 0  |  |  |  |  |
| 20 FT           | 11               | 12 | 9  | 8  | 5             | 7.5  | 5       | 6.5  | 36.8 | 31.0              | 31.0    | 5    | 14   | 32.0 | 36.0    | 5    | 14   | 21.0 | 22.0    | 5    | 7                | 5    | 6.5  | 37.0 | 92                | 104 | 5    | 6                          | 32.0 | 36.0 | 5    | 12   | 5         | 11   | 0  |  |  |  |  |
| 22 FT           | 11               | 13 | 9  | 8  | 5             | 7    | 5       | 6    | 36.5 | 31.0              | 31.0    | 5    | 14   | 32.0 | 35.0    | 5    | 14   | 22.0 | 23.0    | 5    | 7                | 5    | 7    | 37.0 | 93                | 105 | 5    | 6                          | 32.0 | 36.0 | 5    | 12   | 5         | 10   | 0  |  |  |  |  |
| 24 FT           | 12               | 13 | 9  | 8  | 5             | 7    | 5       | 7    | 34.8 | 32.0              | 32.0    | 5    | 13   | 31.0 | 35.0    | 5    | 13   | 21.0 | 22.0    | 5    | 6                | 5    | 7    | 35.0 | 93                | 105 | 6    | 8                          | 34.0 | 39.0 | 5    | 12   | 5         | 10.5 | 0  |  |  |  |  |
| 26 FT           | 13               | 14 | 9  | 8  | 5             | 7    | 5       | 7    | 34.9 | 33.0              | 33.0    | 5    | 12   | 31.0 | 35.0    | 5    | 12   | 20.0 | 21.0    | 5    | 6.5              | 5    | 7.5  | 35.3 | 94                | 106 | 5    | 6                          | 31.0 | 36.0 | 5    | 12   | 5         | 9.5  | 0  |  |  |  |  |
| 28 FT           | 13               | 15 | 9  | 8  | 5             | 6.5  | 5       | 6.5  | 34.9 | 33.0              | 33.0    | 5    | 12   | 31.0 | 35.0    | 5    | 12   | 21.0 | 22.0    | 5    | 6.5              | 5    | 7.5  | 35.4 | 95                | 107 | 5    | 6                          | 31.0 | 36.0 | 5    | 12   | 5         | 9    | 0  |  |  |  |  |
| 30 FT           | 14               | 15 | 9  | 8  | 5             | 6.5  | 5       | 7    | 35.0 | 34.0              | 34.0    | 5    | 12   | 31.0 | 35.0    | 5    | 12   | 20.0 | 21.0    | 5    | 6                | 5    | 7    | 35.4 | 95                | 107 | 6    | 8                          | 34.0 | 39.0 | 5    | 12   | 5         | 8.5  | 0  |  |  |  |  |
| 32 FT           | 14               | 16 | 9  | 8  | 5             | 6    | 5       | 6    | 35.0 | 34.0              | 34.0    | 5    | 12   | 31.0 | 35.0    | 5    | 12   | 20.0 | 21.0    | 5    | 6                | 5    | 7    | 35.5 | 96                | 108 | 6    | 8                          | 35.0 | 39.0 | 5    | 12   | 5         | 8.5  | 0  |  |  |  |  |
| 34 FT           | 15               | 17 | 10 | 8  | 5             | 6    | 5       | 7    | 40.8 | 35.0              | 35.0    | 6    | 16   | 40.0 | 44.0    | 6    | 16   | 29.0 | 30.0    | 5    | 6                | 5    | 7.5  | 36.0 | 97                | 109 | 6    | 8.5                        | 35.0 | 40.0 | 5    | 12   | 5         | 8.5  | 0  |  |  |  |  |
| 36 FT           | 16               | 17 | 10 | 8  | 5             | 6    | 5       | 7    | 40.8 | 36.0              | 36.0    | 6    | 17   | 39.0 | 44.0    | 6    | 17   | 29.0 | 30.0    | 5    | 6                | 5    | 7.5  | 36.0 | 97                | 109 | 6    | 8                          | 35.0 | 40.0 | 5    | 12   | 5         | 8    | 0  |  |  |  |  |
| 38 FT           | 16               | 18 | 11 | 8  | 5             | 6    | 5       | 7    | 41.5 | 36.0              | 36.0    | 6    | 16   | 39.0 | 44.0    | 6    | 16   | 29.0 | 30.0    | 5    | 6                | 5    | 7    | 36.5 | 98                | 110 | 6    | 8                          | 35.0 | 40.0 | 5    | 12   | 5         | 8.5  | 0  |  |  |  |  |
| 40 FT           | 17               | 18 | 11 | 8  | 5             | 6    | 5       | 7    | 41.5 | 37.0              | 37.0    | 6    | 16   | 39.0 | 43.0    | 6    | 16   | 29.0 | 30.0    | 6    | 8                | 5    | 7    | 36.5 | 98                | 110 | 6    | 7.5                        | 35.0 | 40.0 | 5    | 12   | 5         | 8    | 0  |  |  |  |  |
| 42 FT           | 17               | 19 | 11 | 8  | 6             | 8    | 5       | 6.5  | 41.6 | 37.0              | 37.0    | 6    | 16   | 39.0 | 43.0    | 6    | 16   | 29.0 | 30.0    | 6    | 8.5              | 5    | 7    | 36.8 | 99                | 111 | 6    | 7.5                        | 35.0 | 40.0 | 5    | 12   | 5         | 7.5  | 0  |  |  |  |  |
| 44 FT           | 18               | 19 | 12 | 8  | 6             | 8    | 5       | 6.5  | 42.3 | 38.0              | 38.0    | 6    | 16   | 39.0 | 43.0    | 6    | 16   | 29.0 | 29.0    | 6    | 8                | 5    | 6.5  | 37.0 | 99                | 111 | 6    | 7.5                        | 35.0 | 40.0 | 5    | 12   | 5         | 8    | 0  |  |  |  |  |
| 46 FT           | 18               | 20 | 12 | 8  | 6             | 8    | 5       | 6.5  | 42.4 | 38.0              | 38.0    | 6    | 15   | 39.0 | 43.0    | 6    | 15   | 29.0 | 29.0    | 6    | 8                | 5    | 6.5  | 37.1 | 100               | 112 | 6    | 7.5                        | 35.0 | 40.0 | 5    | 12   | 5         | 7.5  | 0  |  |  |  |  |
| 48 FT           | 18               | 20 | 12 | 8  | 6             | 7.5  | 5       | 6.5  | 42.4 | 38.0              | 38.0    | 6    | 15   | 39.0 | 43.0    | 6    | 15   | 29.0 | 29.0    | 6    | 7.5              | 5    | 6.5  | 37.1 | 100               | 112 | 6    | 7                          | 35.0 | 40.0 | 5    | 12   | 5         | 7.5  | 0  |  |  |  |  |
| 50 FT           | 19               | 21 | 12 | 8  | 6             | 7.5  | 5       | 6    | 42.5 | 39.0              | 39.0    | 6    | 15   | 39.0 | 43.0    | 6    | 15   | 28.0 | 29.0    | 6    | 8                | 5    | 6.5  | 37.5 | 101               | 113 | 6    | 7.5                        | 35.0 | 40.0 | 5    | 12   | 5         | 7    | 0  |  |  |  |  |



| SPAN (S) = 7 FT |                     |    |    |    |               |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |         |        |      |      |         |      |           | HEIGHT (HT) = 9 FT OR 10 FT |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|--------|------|------|---------|------|-----------|-----------------------------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |        |      |      |         |      | WALL BARS |                             |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |        |      |      | B1 BARS |      | B2 BARS   |                             |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |        | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                        | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=9' | HT=10'  |      |      |      |         |      |      |      |         |      |                  |      |      |      | HT=9'   | HT=10' |      |      |         |      |           |                             |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 12                  | 9  | 8  | 8  | 5             | 7.5  | 5       | 9    | 41.1 | 28.0  | 32.0    | 4    | 16   | 72.5 | 54.5    | 4    | 16   | 26.0 | 27.0    | 4    | 8                | 5    | 6    | 60.0 | 113     | 125    | 4    | 7    | 58.0    | 38.0 | 5         | 12                          | 5    | 12   | 2  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 12                  | 9  | 8  | 8  | 5             | 7    | 5       | 8.5  | 41.1 | 28.0  | 32.0    | 4    | 15   | 72.5 | 54.5    | 4    | 15   | 25.0 | 26.0    | 4    | 7.5              | 6    | 7    | 63.0 | 113     | 125    | 4    | 6.5  | 39.0    | 38.0 | 5         | 12                          | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 12                  | 9  | 9  | 8  | 5             | 7    | 5       | 6    | 44.8 | 28.0  | 32.0    | 5    | 17   | 75.5 | 58.0    | 5    | 17   | 25.0 | 26.0    | 4    | 7                | 6    | 7    | 63.0 | 113     | 125    | 4    | 6    | 39.0    | 38.0 | 5         | 12                          | 5    | 11   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 9  | 9  | 8  | 4             | 6    | 5       | 6    | 44.8 | 24.0  | 28.0    | 5    | 17   | 75.5 | 58.0    | 5    | 17   | 23.0 | 23.0    | 4    | 7                | 5    | 6    | 60.8 | 113     | 125    | 4    | 6    | 37.0    | 38.0 | 5         | 12                          | 5    | 11   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 9  | 10 | 8  | 4             | 6.5  | 5       | 6.5  | 59.1 | 24.0  | 28.0    | 5    | 17   | 45.0 | 43.0    | 5    | 17   | 22.0 | 22.0    | 4    | 7                | 5    | 6.5  | 56.3 | 113     | 125    | 5    | 7.5  | 34.0    | 37.0 | 5         | 12                          | 5    | 11   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 9  | 10 | 8  | 4             | 6.5  | 5       | 6.5  | 50.8 | 28.0  | 28.0    | 5    | 17   | 38.0 | 38.0    | 5    | 17   | 22.0 | 22.0    | 4    | 6.5              | 5    | 6    | 51.8 | 113     | 125    | 5    | 7    | 33.0    | 36.0 | 5         | 12                          | 5    | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 9  | 10 | 8  | 4             | 6    | 6       | 7.5  | 50.9 | 28.0  | 32.0    | 5    | 16   | 36.0 | 37.0    | 5    | 16   | 23.0 | 23.0    | 5    | 9                | 6    | 6.5  | 52.6 | 113     | 125    | 5    | 6    | 33.0    | 36.0 | 5         | 12                          | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 8                   | 10 | 10 | 8  | 4             | 6    | 6       | 6.5  | 48.5 | 28.0  | 32.0    | 5    | 15   | 35.0 | 36.0    | 5    | 15   | 23.0 | 24.0    | 5    | 8.5              | 6    | 7    | 53.1 | 114     | 126    | 5    | 6.5  | 33.0    | 36.0 | 5         | 12                          | 5    | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 9                   | 10 | 10 | 8  | 5             | 8.5  | 5       | 6    | 46.4 | 29.0  | 29.0    | 5    | 16   | 34.0 | 36.0    | 5    | 16   | 23.0 | 23.0    | 5    | 8                | 6    | 7    | 51.3 | 114     | 126    | 5    | 6    | 33.0    | 36.0 | 5         | 12                          | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 9                   | 11 | 10 | 8  | 5             | 8    | 5       | 6    | 44.8 | 29.0  | 29.0    | 5    | 15   | 33.0 | 35.0    | 5    | 15   | 23.0 | 24.0    | 5    | 7.5              | 6    | 7    | 51.8 | 115     | 127    | 5    | 6    | 33.0    | 36.0 | 5         | 12                          | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 10                  | 12 | 10 | 8  | 5             | 8    | 5       | 6.5  | 45.3 | 30.0  | 30.0    | 5    | 15   | 33.0 | 35.0    | 5    | 15   | 22.0 | 23.0    | 5    | 7.5              | 6    | 7    | 51.8 | 116     | 128    | 5    | 6.5  | 33.0    | 36.0 | 5         | 12                          | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 11                  | 12 | 10 | 8  | 5             | 7.5  | 5       | 6    | 46.1 | 31.0  | 31.0    | 5    | 14   | 33.0 | 35.0    | 5    | 14   | 21.0 | 22.0    | 5    | 7                | 6    | 6.5  | 50.8 | 116     | 128    | 5    | 6    | 33.0    | 36.0 | 5         | 12                          | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 11                  | 13 | 10 | 8  | 5             | 7.5  | 5       | 6    | 45.4 | 31.0  | 31.0    | 5    | 14   | 32.0 | 35.0    | 5    | 14   | 22.0 | 23.0    | 5    | 7                | 6    | 6.5  | 51.4 | 117     | 129    | 5    | 6    | 33.0    | 36.0 | 5         | 12                          | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 12                  | 13 | 10 | 8  | 5             | 7    | 5       | 6    | 43.4 | 32.0  | 32.0    | 5    | 13   | 31.0 | 35.0    | 5    | 13   | 21.0 | 22.0    | 5    | 6                | 6    | 6.5  | 48.0 | 117     | 129    | 6    | 8    | 35.0    | 39.0 | 5         | 12                          | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 12                  | 14 | 10 | 8  | 5             | 7    | 6       | 7.5  | 46.1 | 32.0  | 36.0    | 5    | 13   | 31.0 | 35.0    | 5    | 13   | 21.0 | 22.0    | 5    | 6.5              | 6    | 7    | 48.6 | 118     | 130    | 6    | 8.5  | 35.0    | 39.0 | 5         | 12                          | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 13                  | 15 | 11 | 8  | 5             | 6.5  | 5       | 6    | 43.6 | 33.0  | 33.0    | 5    | 12   | 31.0 | 35.0    | 5    | 12   | 20.0 | 21.0    | 5    | 6.5              | 5    | 6.5  | 45.9 | 119     | 131    | 5    | 6    | 32.0    | 36.0 | 5         | 12                          | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 14                  | 15 | 11 | 8  | 5             | 6.5  | 5       | 6    | 44.3 | 34.0  | 34.0    | 5    | 12   | 31.0 | 35.0    | 5    | 12   | 20.0 | 21.0    | 5    | 6                | 5    | 6    | 45.5 | 119     | 131    | 6    | 8    | 35.0    | 39.0 | 5         | 12                          | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 14                  | 16 | 12 | 8  | 5             | 6.5  | 5       | 6    | 44.1 | 34.0  | 34.0    | 5    | 12   | 31.0 | 34.0    | 5    | 12   | 20.0 | 21.0    | 5    | 6.5              | 5    | 6    | 45.9 | 120     | 132    | 6    | 8    | 35.0    | 40.0 | 5         | 12                          | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 15                  | 17 | 12 | 8  | 5             | 6.5  | 5       | 6    | 49.6 | 35.0  | 35.0    | 6    | 17   | 40.0 | 43.0    | 6    | 17   | 29.0 | 30.0    | 5    | 6.5              | 5    | 6.5  | 46.5 | 121     | 133    | 6    | 8    | 36.0    | 40.0 | 5         | 12                          | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 15                  | 17 | 13 | 8  | 5             | 6    | 5       | 6    | 49.6 | 35.0  | 35.0    | 6    | 16   | 40.0 | 43.0    | 6    | 16   | 29.0 | 30.0    | 5    | 6                | 5    | 6    | 46.0 | 121     | 133    | 6    | 7.5  | 35.0    | 40.0 | 5         | 12                          | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 16                  | 18 | 13 | 8  | 5             | 6    | 6       | 8.5  | 54.1 | 36.0  | 36.0    | 6    | 16   | 40.0 | 43.0    | 6    | 16   | 29.0 | 29.0    | 5    | 6                | 5    | 6    | 46.6 | 122     | 134    | 6    | 8    | 36.0    | 40.0 | 5         | 12                          | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 16                  | 18 | 13 | 8  | 6             | 8.5  | 6       | 8    | 54.0 | 36.0  | 36.0    | 6    | 15   | 40.0 | 43.0    | 6    | 15   | 29.0 | 30.0    | 5    | 6                | 5    | 6    | 46.5 | 122     | 134    | 6    | 7.5  | 36.0    | 40.0 | 5         | 12                          | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 17                  | 19 | 14 | 8  | 5             | 6    | 6       | 8    | 54.8 | 37.0  | 37.0    | 6    | 16   | 39.0 | 42.0    | 6    | 16   | 29.0 | 29.0    | 5    | 6                | 5    | 6    | 46.9 | 123     | 135    | 6    | 7.5  | 36.0    | 40.0 | 5         | 12                          | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 17                  | 19 | 14 | 8  | 6             | 8    | 6       | 8    | 54.6 | 37.0  | 37.0    | 6    | 15   | 39.0 | 42.0    | 6    | 15   | 29.0 | 29.0    | 6    | 8                | 5    | 6    | 46.8 | 123     | 135    | 6    | 7    | 36.0    | 40.0 | 5         | 12                          | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 18                  | 20 | 14 | 8  | 6             | 8    | 6       | 7.5  | 55.3 | 38.0  | 38.0    | 6    | 16   | 39.0 | 42.0    | 6    | 16   | 28.0 | 29.0    | 6    | 8                | 5    | 6    | 47.3 | 124     | 136    | 6    | 7.5  | 36.0    | 40.0 | 5         | 12                          | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 18                  | 20 | 15 | 8  | 6             | 7.5  | 6       | 8    | 55.4 | 38.0  | 42.0    | 6    | 15   | 39.0 | 42.0    | 6    | 15   | 28.0 | 29.0    | 6    | 7.5              | 6    | 8    | 50.0 | 124     | 136    | 6    | 7    | 36.0    | 40.0 | 5         | 12                          | 6    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 18                  | 21 | 15 | 8  | 6             | 7    | 6       | 7.5  | 55.4 | 38.0  | 42.0    | 6    | 14   | 39.0 | 42.0    | 6    | 14   | 28.0 | 29.0    | 6    | 8                | 6    | 8    | 50.6 | 125     | 137    | 6    | 7    | 36.0    | 40.0 | 5         | 12                          | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
BRYAN A. HARTNAGEL  
NUMBER  
PE-2002024473  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CONCRETE  
TRIPLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 7 FEET  
HEIGHT (HT): 9 THRU 10 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.87A

SHEET NO.  
9 OF 27

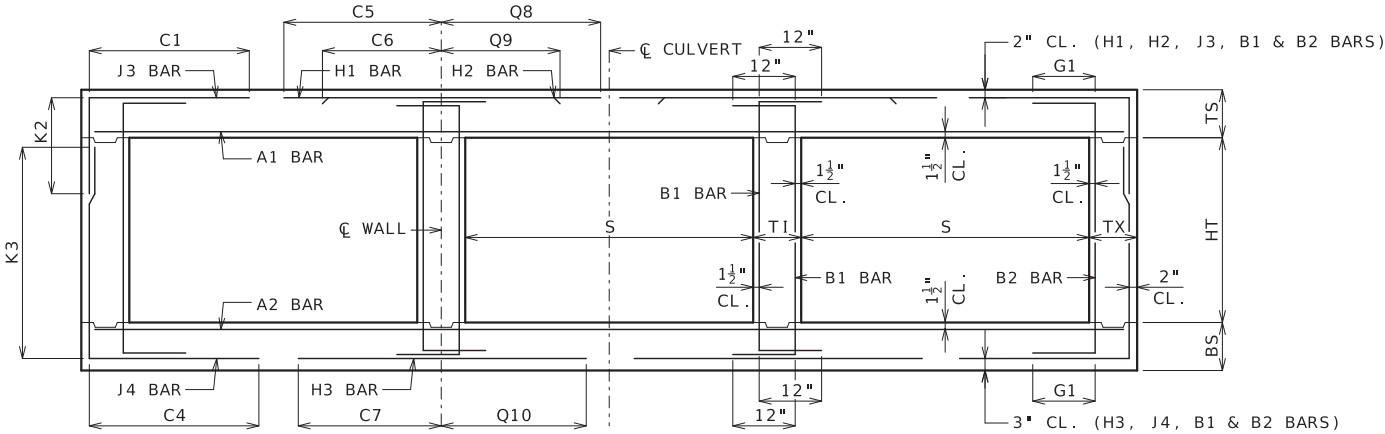
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| SPAN (S) = 8 FT |                  |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         | HEIGHT (HT) = 4 FT OR 5 FT OR 6 FT |         |      |           |      |      |      |    |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------------------------------------|---------|------|-----------|------|------|------|----|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |                                    |         |      | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |                                    | B2 BARS |      |           |      |      |      |    |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA.                               | C7      | Q10  | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=4' | HT=5'   | HT=6' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=4' | HT=5' | HT=6' |         |                                    |         |      |           |      |      |      |    |  |  |  |  |  |  |  |
| 1 FT            | 12               | 8  | 8  | 8  | 5             | 7    | 4       | 8.5  | 44.8 | 28.0  | 28.0    | 28.0  | 4    | 13   | 81.5    | 60.5 | 4    | 13   | 27.0    | 23.0 | 4                | 7.5  | 4    | 6.5  | 42.0    | 52    | 64    | 76    | 5       | 7                                  | 39.0    | 40.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 2 FT            | 12               | 8  | 8  | 8  | 5             | 7    | 4       | 8.5  | 44.8 | 28.0  | 28.0    | 28.0  | 4    | 12   | 81.5    | 60.5 | 4    | 12   | 26.0    | 25.0 | 4                | 6.5  | 4    | 6    | 38.8    | 52    | 64    | 76    | 5       | 6.5                                | 38.0    | 40.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 2' - 4'         | 12               | 8  | 8  | 8  | 5             | 7    | 5       | 6    | 44.8 | 28.0  | 28.0    | 28.0  | 5    | 16   | 81.5    | 64.0 | 5    | 16   | 27.0    | 27.0 | 4                | 6    | 4    | 6    | 38.8    | 52    | 64    | 76    | 5       | 6                                  | 38.0    | 40.0 | 5         | 11   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 6    | 5       | 6    | 40.6 | 24.0  | 24.0    | 24.0  | 5    | 16   | 50.0    | 64.0 | 5    | 16   | 27.0    | 27.0 | 4                | 6    | 4    | 6    | 35.4    | 52    | 64    | 76    | 5       | 6                                  | 38.0    | 40.0 | 5         | 11   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 6 FT            | 8                | 8  | 8  | 8  | 4             | 6    | 5       | 6.5  | 36.5 | 28.0  | 24.0    | 28.0  | 5    | 15   | 42.0    | 45.0 | 5    | 15   | 26.0    | 26.0 | 5                | 8.5  | 5    | 6.5  | 33.5    | 52    | 64    | 76    | 6       | 7                                  | 39.0    | 41.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |
| 8 FT            | 8                | 9  | 8  | 8  | 4             | 6    | 5       | 6    | 34.4 | 24.0  | 24.0    | 24.0  | 5    | 14   | 39.0    | 41.0 | 5    | 14   | 25.0    | 25.0 | 5                | 8    | 4    | 6.5  | 31.9    | 53    | 65    | 77    | 5       | 6                                  | 36.0    | 39.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 10 FT           | 9                | 10 | 8  | 8  | 5             | 8.5  | 4       | 6    | 32.6 | 25.0  | 25.0    | 25.0  | 5    | 15   | 38.0    | 41.0 | 5    | 15   | 25.0    | 25.0 | 5                | 8    | 4    | 7.5  | 30.5    | 54    | 66    | 78    | 5       | 6                                  | 35.0    | 39.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 12 FT           | 9                | 10 | 8  | 8  | 5             | 8.5  | 5       | 6.5  | 31.6 | 25.0  | 25.0    | 25.0  | 5    | 14   | 37.0    | 40.0 | 5    | 14   | 24.0    | 25.0 | 5                | 7    | 4    | 6.5  | 29.8    | 54    | 66    | 78    | 6       | 7                                  | 38.0    | 42.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 14 FT           | 10               | 11 | 8  | 8  | 5             | 8    | 5       | 7.5  | 30.5 | 26.0  | 26.0    | 26.0  | 5    | 14   | 36.0    | 40.0 | 5    | 14   | 24.0    | 25.0 | 5                | 6.5  | 4    | 6.5  | 29.0    | 55    | 67    | 79    | 5       | 6                                  | 34.0    | 39.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 16 FT           | 11               | 12 | 8  | 8  | 5             | 7.5  | 5       | 8.5  | 29.6 | 27.0  | 27.0    | 27.0  | 5    | 14   | 35.0    | 40.0 | 5    | 14   | 24.0    | 25.0 | 5                | 6.5  | 4    | 6.5  | 28.4    | 56    | 68    | 80    | 5       | 6                                  | 34.0    | 39.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 18 FT           | 11               | 13 | 8  | 8  | 5             | 7.5  | 5       | 8    | 29.5 | 27.0  | 27.0    | 27.0  | 5    | 13   | 35.0    | 39.0 | 5    | 13   | 24.0    | 25.0 | 5                | 6    | 4    | 6.5  | 27.6    | 57    | 69    | 81    | 6       | 8                                  | 37.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 20 FT           | 12               | 14 | 8  | 8  | 5             | 7    | 5       | 8.5  | 28.8 | 28.0  | 28.0    | 28.0  | 5    | 13   | 35.0    | 39.0 | 5    | 13   | 24.0    | 25.0 | 5                | 6    | 4    | 6.5  | 27.3    | 58    | 70    | 82    | 6       | 8                                  | 36.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 22 FT           | 13               | 14 | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 28.1 | 29.0  | 29.0    | 29.0  | 5    | 12   | 34.0    | 40.0 | 5    | 12   | 23.0    | 24.0 | 6                | 8    | 4    | 6    | 27.4    | 58    | 70    | 82    | 6       | 7.5                                | 37.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 24 FT           | 14               | 15 | 8  | 8  | 5             | 6    | 5       | 8.5  | 27.9 | 30.0  | 30.0    | 30.0  | 5    | 12   | 34.0    | 40.0 | 5    | 12   | 22.0    | 23.0 | 6                | 8    | 4    | 6    | 27.3    | 59    | 71    | 83    | 6       | 7.5                                | 36.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 26 FT           | 15               | 16 | 8  | 8  | 6             | 8.5  | 5       | 8    | 32.6 | 31.0  | 31.0    | 31.0  | 6    | 16   | 42.0    | 49.0 | 6    | 16   | 30.0    | 32.0 | 6                | 8    | 4    | 6    | 27.3    | 60    | 72    | 84    | 6       | 7.5                                | 36.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 28 FT           | 15               | 16 | 8  | 8  | 6             | 8    | 5       | 8    | 31.6 | 31.0  | 31.0    | 31.0  | 6    | 16   | 42.0    | 48.0 | 6    | 16   | 31.0    | 32.0 | 6                | 7.5  | 4    | 6    | 26.1    | 60    | 72    | 84    | 6       | 7                                  | 36.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 30 FT           | 16               | 17 | 8  | 8  | 6             | 8    | 5       | 7    | 31.5 | 32.0  | 32.0    | 32.0  | 6    | 15   | 42.0    | 48.0 | 6    | 15   | 30.0    | 31.0 | 6                | 7.5  | 4    | 6    | 26.3    | 61    | 73    | 85    | 6       | 7                                  | 36.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 32 FT           | 16               | 18 | 8  | 8  | 6             | 7.5  | 5       | 7    | 31.6 | 32.0  | 36.0    | 36.0  | 6    | 15   | 42.0    | 48.0 | 6    | 15   | 31.0    | 32.0 | 6                | 7.5  | 5    | 6.5  | 26.1    | 62    | 74    | 86    | 6       | 7                                  | 36.0    | 43.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |
| 34 FT           | 17               | 19 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 31.6 | 37.0  | 37.0    | 37.0  | 6    | 14   | 42.0    | 48.0 | 6    | 14   | 30.0    | 31.0 | 6                | 7.5  | 5    | 6.5  | 26.3    | 63    | 75    | 87    | 6       | 7                                  | 36.0    | 43.0 | 5         | 12   | 5    | 11.5 | 0  |  |  |  |  |  |  |  |
| 36 FT           | 18               | 19 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 31.5 | 38.0  | 38.0    | 38.0  | 6    | 14   | 42.0    | 48.0 | 6    | 14   | 30.0    | 31.0 | 6                | 7.5  | 5    | 6.5  | 26.4    | 63    | 75    | 87    | 6       | 7                                  | 36.0    | 43.0 | 5         | 12   | 5    | 10.5 | 0  |  |  |  |  |  |  |  |
| 38 FT           | 18               | 20 | 8  | 8  | 6             | 7    | 5       | 6.5  | 31.6 | 38.0  | 38.0    | 38.0  | 6    | 13   | 42.0    | 48.0 | 6    | 13   | 30.0    | 31.0 | 6                | 7.5  | 5    | 6    | 26.4    | 64    | 76    | 88    | 6       | 7                                  | 36.0    | 43.0 | 5         | 12   | 5    | 10   | 0  |  |  |  |  |  |  |  |
| 40 FT           | 19               | 20 | 8  | 8  | 6             | 7    | 5       | 6    | 31.6 | 39.0  | 39.0    | 39.0  | 6    | 13   | 42.0    | 48.0 | 6    | 13   | 29.0    | 31.0 | 6                | 6.5  | 5    | 6    | 26.5    | 64    | 76    | 88    | 6       | 6.5                                | 36.0    | 43.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 42 FT           | 19               | 21 | 8  | 8  | 6             | 6    | 5       | 6    | 31.8 | 39.0  | 39.0    | 39.0  | 6    | 12   | 42.0    | 48.0 | 6    | 12   | 30.0    | 31.0 | 6                | 7    | 6    | 7.5  | 29.6    | 65    | 77    | 89    | 6       | 6.5                                | 36.0    | 43.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 44 FT           | 20               | 22 | 8  | 8  | 6             | 6.5  | 6       | 7.5  | 35.9 | 44.0  | 44.0    | 44.0  | 6    | 13   | 41.0    | 48.0 | 6    | 13   | 29.0    | 30.0 | 6                | 7    | 6    | 7    | 29.8    | 66    | 78    | 90    | 6       | 6.5                                | 36.0    | 43.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 46 FT           | 21               | 22 | 8  | 8  | 6             | 6.5  | 6       | 7    | 35.8 | 45.0  | 45.0    | 45.0  | 6    | 13   | 41.0    | 48.0 | 6    | 13   | 29.0    | 30.0 | 6                | 6.5  | 6    | 7    | 29.9    | 66    | 78    | 90    | 6       | 6.5                                | 36.0    | 43.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 48 FT           | 21               | 23 | 8  | 8  | 6             | 6.5  | 6       | 7    | 36.0 | 45.0  | 45.0    | 45.0  | 6    | 13   | 41.0    | 48.0 | 6    | 13   | 29.0    | 30.0 | 6                | 7    | 6    | 6.5  | 30.0    | 67    | 79    | 91    | 6       | 6.5                                | 36.0    | 43.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |
| 50 FT           | 22               | 23 | 8  | 8  | 6             | 6.5  | 6       | 6.5  | 35.9 | 46.0  | 46.0    | 46.0  | 6    | 13   | 41.0    | 47.0 | 6    | 13   | 29.0    | 30.0 | 6                | 6.5  | 6    | 6.5  | 30.1    | 67    | 79    | 91    | 6       | 6                                  | 36.0    | 43.0 | 5         | 12   | 5    | 9    | 0  |  |  |  |  |  |  |  |

| SPAN (S) = 8 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |      |      |         |      |      |      |                  |      |         |      |      |       |       | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |         |      |      |      |         |      |         |      |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|------|------|---------|------|------|------|------------------|------|---------|------|------|-------|-------|------------------------------------|---------|------|------|------|---------|------|---------|------|-----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL     | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |      |      |         |      |      |      | BOTTOM SLAB BARS |      |         |      |      |       |       |                                    |         |      |      |      |         |      |         |      | WALL BARS |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS          |      | J4 BARS |      |      |       |       |                                    | H3 BARS |      |      |      | B1 BARS |      | B2 BARS |      |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5   | Q8   | SIZE    | SPA. | C6   | Q9   | SIZE             | SPA. | SIZE    | SPA. | C4   | K3    |       |                                    | SIZE    | SPA. | C7   | Q10  | SIZE    | SPA. | SIZE    | SPA. | G1        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                  |    |    |    |               |      |         |      |      | HT=7' | HT=8' | HT=9' |         |      |      |      |         |      |      |      |                  |      |         |      |      | HT=7' | HT=8' | HT=9'                              |         |      |      |      |         |      |         |      |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 12               | 9  | 8  | 8  | 5             | 7    | 4       | 6    | 44.8 | 28.0  | 28.0  | 28.0  | 4       | 13   | 81.5 | 60.5 | 4       | 13   | 27.0 | 25.0 | 4                | 7.5  | 4       | 6    | 66.0 | 89    | 101   | 113                                | 5       | 8    | 41.0 | 41.0 | 5       | 12   | 5       | 12   | 12        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 12               | 9  | 8  | 8  | 5             | 7    | 4       | 6    | 44.8 | 28.0  | 28.0  | 28.0  | 4       | 12   | 81.5 | 60.5 | 4       | 12   | 26.0 | 24.0 | 4                | 6.5  | 5       | 6.5  | 61.3 | 89    | 101   | 113                                | 5       | 7.5  | 39.0 | 41.0 | 5       | 12   | 5       | 12   | 12        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'          | 12               | 9  | 8  | 8  | 5             | 7    | 6       | 7.5  | 47.8 | 28.0  | 32.0  | 32.0  | 5       | 16   | 83.5 | 64.0 | 5       | 16   | 27.0 | 28.0 | 5                | 8.5  | 6       | 6    | 61.3 | 89    | 101   | 113                                | 5       | 6    | 39.0 | 41.0 | 5       | 12   | 5       | 12   | 12        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                | 8  | 8  | 8  | 4             | 6    | 6       | 7.5  | 47.8 | 28.0  | 32.0  | 32.0  | 5       | 16   | 83.5 | 64.0 | 5       | 16   | 27.0 | 28.0 | 5                | 8.5  | 6       | 6    | 55.0 | 88    | 100   | 112                                | 5       | 6    | 38.0 | 40.0 | 5       | 12   | 5       | 12   | 12        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                | 9  | 8  | 8  | 4             | 6    | 6       | 7.5  | 52.5 | 24.0  | 28.0  | 32.0  | 5       | 15   | 44.0 | 47.0 | 5       | 15   | 26.0 | 26.0 | 5                | 8.5  | 6       | 6.5  | 52.3 | 89    | 101   | 113                                | 5       | 6.5  | 37.0 | 40.0 | 5       | 12   | 5       | 12   | 12        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                | 9  | 8  | 8  | 4             | 6    | 6       | 7.5  | 47.4 | 24.0  | 28.0  | 32.0  | 5       | 14   | 40.0 | 42.0 | 5       | 14   | 25.0 | 25.0 | 5                | 7.5  | 6       | 6    | 48.1 | 89    | 101   | 113                                | 5       | 6    | 36.0 | 39.0 | 5       | 12   | 5       | 11.5 | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 9                | 10 | 8  | 8  | 5             | 8.5  | 6       | 7    | 46.3 | 25.0  | 29.0  | 33.0  | 5       | 15   | 39.0 | 41.0 | 5       | 15   | 25.0 | 25.0 | 5                | 7.5  | 6       | 6.5  | 46.9 | 90    | 102   | 114                                | 5       | 6    | 35.0 | 39.0 | 5       | 12   | 5       | 11   | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 9                | 10 | 8  | 8  | 5             | 8.5  | 6       | 7    | 44.8 | 29.0  | 33.0  | 33.0  | 5       | 14   | 37.0 | 40.0 | 5       | 14   | 24.0 | 25.0 | 5                | 6.5  | 6       | 6    | 45.4 | 90    | 102   | 114                                | 6       | 7    | 38.0 | 42.0 | 5       | 12   | 5       | 10   | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 10               | 11 | 8  | 8  | 5             | 8    | 6       | 6.5  | 44.1 | 30.0  | 30.0  | 34.0  | 5       | 14   | 37.0 | 40.0 | 5       | 14   | 24.0 | 25.0 | 5                | 6.5  | 6       | 6    | 44.9 | 91    | 103   | 115                                | 5       | 6    | 35.0 | 39.0 | 5       | 12   | 5       | 9.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 11               | 12 | 8  | 8  | 5             | 7.5  | 6       | 6.5  | 43.6 | 31.0  | 31.0  | 35.0  | 5       | 14   | 36.0 | 40.0 | 5       | 14   | 24.0 | 25.0 | 5                | 6.5  | 6       | 6.5  | 44.4 | 92    | 104   | 116                                | 5       | 6    | 34.0 | 39.0 | 5       | 12   | 5       | 9.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 11               | 13 | 8  | 8  | 5             | 7.5  | 6       | 6    | 42.8 | 31.0  | 31.0  | 35.0  | 5       | 13   | 35.0 | 39.0 | 5       | 13   | 24.0 | 25.0 | 5                | 6    | 6       | 6.5  | 43.9 | 93    | 105   | 117                                | 6       | 8    | 37.0 | 43.0 | 5       | 12   | 5       | 9.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 12               | 14 | 8  | 8  | 5             | 7    | 6       | 6    | 42.4 | 32.0  | 32.0  | 36.0  | 5       | 13   | 35.0 | 39.0 | 5       | 13   | 24.0 | 25.0 | 5                | 6    | 6       | 6.5  | 43.4 | 94    | 106   | 118                                | 6       | 8    | 37.0 | 43.0 | 5       | 12   | 5       | 9.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 13               | 14 | 8  | 8  | 5             | 6.5  | 6       | 6    | 42.1 | 33.0  | 33.0  | 37.0  | 5       | 12   | 35.0 | 39.0 | 5       | 12   | 23.0 | 24.0 | 6                | 8    | 6       | 6    | 43.0 | 94    | 106   | 118                                | 6       | 7.5  | 37.0 | 43.0 | 5       | 12   | 5       | 9    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 14               | 15 | 10 | 8  | 5             | 6    | 5       | 6.5  | 40.0 | 34.0  | 34.0  | 34.0  | 5       | 12   | 34.0 | 39.0 | 5       | 12   | 22.0 | 23.0 | 6                | 8.5  | 5       | 7    | 40.4 | 95    | 107   | 119                                | 6       | 7    | 37.0 | 43.0 | 5       | 12   | 5       | 8    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 14               | 16 | 10 | 8  | 5             | 6    | 5       | 6    | 39.8 | 34.0  | 34.0  | 34.0  | 5       | 12   | 34.0 | 39.0 | 5       | 12   | 22.0 | 24.0 | 6                | 8    | 5       | 7    | 40.4 | 96    | 108   | 120                                | 6       | 7.5  | 37.0 | 43.0 | 5       | 12   | 5       | 8    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 15               | 16 | 10 | 8  | 6             | 8    | 5       | 6.5  | 43.0 | 35.0  | 35.0  | 35.0  | 6       | 16   | 42.0 | 48.0 | 6       | 16   | 30.0 | 32.0 | 6                | 7.5  | 5       | 7    | 38.4 | 96    | 108   | 120                                | 6       | 7    | 37.0 | 43.0 | 5       | 12   | 5       | 8    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 15               | 17 | 11 | 8  | 6             | 7.5  | 5       | 6.5  | 43.5 | 31.0  | 35.0  | 35.0  | 6       | 15   | 42.0 | 47.0 | 6       | 15   | 31.0 | 32.0 | 6                | 8    | 5       | 7    | 38.8 | 97    | 109   | 121                                | 6       | 7    | 37.0 | 43.0 | 5       | 12   | 5       | 8.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 16               | 18 | 11 | 8  | 6             | 8    | 5       | 6    | 43.8 | 32.0  | 36.0  | 36.0  | 6       | 15   | 42.0 | 47.0 | 6       | 15   | 30.0 | 32.0 | 6                | 8    | 5       | 7    | 39.0 | 98    | 110   | 122                                | 6       | 7    | 37.0 | 43.0 | 5       | 12   | 5       | 8    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 17               | 19 | 11 | 8  | 6             | 7.5  | 5       | 6    | 43.9 | 33.0  | 37.0  | 37.0  | 6       | 14   | 42.0 | 47.0 | 6       | 14   | 30.0 | 31.0 | 6                | 8    | 5       | 7    | 39.3 | 99    | 111   | 123                                | 6       | 7    | 37.0 | 43.0 | 5       | 12   | 5       | 7.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 17               | 19 | 12 | 8  | 6             | 7    | 5       | 6    | 44.4 | 33.0  | 37.0  | 37.0  | 6       | 14   | 42.0 | 47.0 | 6       | 14   | 30.0 | 31.0 | 6                | 7.5  | 5       | 6.5  | 39.3 | 99    | 111   | 123                                | 6       | 6.5  | 37.0 | 43.0 | 5       | 12   | 5       | 8    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 18               | 20 | 12 | 8  | 6             | 7.5  | 5       | 6    | 44.6 | 38.0  | 38.0  | 38.0  | 6       | 13   | 42.0 | 47.0 | 6       | 13   | 29.0 | 31.0 | 6                | 7.5  | 5       | 6.5  | 39.6 | 100   | 112   | 124                                | 6       | 6.5  | 37.0 | 43.0 | 5       | 12   | 5       | 7.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 19               | 20 | 12 | 8  | 6             | 7    | 5       | 6    | 44.6 | 39.0  | 39.0  | 39.0  | 6       | 14   | 42.0 | 47.0 | 6       | 14   | 29.0 | 30.0 | 6                | 6.5  | 5       | 6.5  | 39.6 | 100   | 112   | 124                                | 6       | 6.5  | 37.0 | 43.0 | 5       | 12   | 5       | 7    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 19               | 21 | 12 | 8  | 6             | 7    | 6       | 7.5  | 48.8 | 39.0  | 39.0  | 39.0  | 6       | 13   | 42.0 | 47.0 | 6       | 13   | 29.0 | 30.0 | 6                | 7    | 5       | 6.5  | 39.8 | 101   | 113   | 125                                | 6       | 6.5  | 37.0 | 43.0 | 5       | 12   | 5       | 7    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 20               | 22 | 13 | 8  | 6             | 7    | 5       | 6    | 45.5 | 40.0  | 40.0  | 40.0  | 6       | 14   | 41.0 | 46.0 | 6       | 14   | 29.0 | 30.0 | 6                | 7    | 5       | 6    | 40.3 | 102   | 114   | 126                                | 6       | 6.5  | 37.0 | 44.0 | 5       | 12   | 5       | 7    | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 20               | 22 | 13 | 8  | 6             | 6.5  | 6       | 8    | 49.5 | 40.0  | 40.0  | 40.0  | 6       | 13   | 41.0 | 46.0 | 6       | 13   | 29.0 | 30.0 | 6                | 7    | 5       | 6    | 40.3 | 102   | 114   | 126                                | 6       | 6    | 37.0 | 44.0 | 5       | 12   | 5       | 6.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 21               | 23 | 13 | 8  | 6             | 6.5  | 6       | 8    | 49.6 | 41.0  | 41.0  | 41.0  | 6       | 13   | 41.0 | 46.0 | 6       | 13   | 29.0 | 30.0 | 6                | 7    | 5       | 6    | 40.5 | 103   | 115   | 127                                | 6       | 6.5  | 37.0 | 44.0 | 5       | 12   | 5       | 6.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 21               | 23 | 13 | 8  | 6             | 6.5  | 6       | 7    | 49.6 | 41.0  | 41.0  | 41.0  | 6       | 13   | 41.0 | 46.0 | 6       | 13   | 29.0 | 30.0 | 6                | 6    | 5       | 6    | 40.5 | 103   | 115   | 127                                | 6       | 6    | 37.0 | 44.0 | 5       | 12   | 5       | 6.5  | 0         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 8 FT |                     |    |    |    |               |      |         |      |      |                  |         |      |    |      |         |      |    |      |         |      |                  |      |     |                  |         |      |    |     |         |      |           | HEIGHT (HT) = 10 FT OR 11 FT |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|------------------|---------|------|----|------|---------|------|----|------|---------|------|------------------|------|-----|------------------|---------|------|----|-----|---------|------|-----------|------------------------------|----|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                  |         |      |    |      |         |      |    |      |         |      | BOTTOM SLAB BARS |      |     |                  |         |      |    |     |         |      | WALL BARS |                              |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |                  | H1 BARS |      |    |      | H2 BARS |      |    |      | A2 BARS |      | J4 BARS          |      |     |                  | H3 BARS |      |    |     | B1 BARS |      | B2 BARS   |                              |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2               | SIZE    | SPA. | C5 | Q8   | SIZE    | SPA. | C6 | Q9   | SIZE    | SPA. | SIZE             | SPA. | C4  | K3               | SIZE    | SPA. | C7 | Q10 | SIZE    | SPA. | SIZE      | SPA.                         | G1 |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=10'<br>HT=11' |         |      |    |      |         |      |    |      |         |      |                  |      |     | HT=10'<br>HT=11' |         |      |    |     |         |      |           |                              |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 12                  | 9  | 8  | 9  | 5             | 7    | 5       | 7    | 44.9 | 32.0             | 32.0    | 4    | 13 | 81.5 | 61.5    | 4    | 13 | 28.0 | 26.0    | 4    | 6.5              | 6    | 6   | 69.3             | 125     | 137  | 5  | 7.5 | 43.0    | 42.0 | 5         | 11.5                         | 5  | 10   | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 12                  | 9  | 9  | 9  | 5             | 7    | 5       | 8    | 45.5 | 32.0             | 32.0    | 4    | 12 | 82.5 | 61.5    | 4    | 12 | 27.0 | 24.0    | 4    | 6.5              | 6    | 6.5 | 70.0             | 125     | 137  | 5  | 7   | 41.0    | 41.0 | 5         | 11.5                         | 5  | 10.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 12                  | 9  | 10 | 9  | 5             | 7    | 6       | 7    | 49.1 | 32.0             | 32.0    | 5    | 16 | 84.5 | 65.0    | 5    | 16 | 27.0 | 27.0    | 4    | 6                | 6    | 6.5 | 70.0             | 125     | 137  | 5  | 7   | 41.0    | 41.0 | 5         | 11.5                         | 5  | 9.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 8                   | 9  | 10 | 9  | 4             | 6    | 6       | 7    | 49.1 | 28.0             | 28.0    | 5    | 16 | 84.5 | 65.0    | 5    | 16 | 27.0 | 27.0    | 4    | 6                | 5    | 6   | 65.8             | 125     | 137  | 5  | 7   | 39.0    | 41.0 | 5         | 11.5                         | 5  | 9.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 8                   | 9  | 11 | 9  | 4             | 6    | 5       | 6    | 57.1 | 28.0             | 28.0    | 5    | 16 | 44.0 | 44.0    | 5    | 16 | 26.0 | 26.0    | 5    | 9                | 5    | 6   | 56.6             | 125     | 137  | 5  | 6.5 | 37.0    | 39.0 | 5         | 11.5                         | 5  | 9.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 8                   | 10 | 11 | 9  | 4             | 6    | 6       | 7    | 54.8 | 28.0             | 28.0    | 5    | 15 | 41.0 | 41.0    | 5    | 15 | 25.0 | 26.0    | 5    | 9                | 5    | 6.5 | 56.4             | 126     | 138  | 5  | 6.5 | 37.0    | 39.0 | 5         | 12                           | 5  | 9    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 8                   | 10 | 11 | 9  | 4             | 6    | 6       | 6.5  | 51.9 | 28.0             | 28.0    | 5    | 14 | 39.0 | 40.0    | 5    | 14 | 25.0 | 25.0    | 5    | 7.5              | 5    | 6   | 54.0             | 126     | 138  | 5  | 6   | 36.0    | 39.0 | 5         | 12                           | 5  | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 9                   | 11 | 11 | 9  | 5             | 8.5  | 6       | 7    | 52.5 | 29.0             | 29.0    | 5    | 14 | 38.0 | 39.0    | 5    | 14 | 25.0 | 25.0    | 5    | 7.5              | 5    | 6   | 53.9             | 127     | 139  | 5  | 6   | 36.0    | 39.0 | 5         | 12                           | 5  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 10                  | 11 | 11 | 9  | 5             | 8    | 5       | 6    | 50.1 | 30.0             | 30.0    | 5    | 15 | 37.0 | 39.0    | 5    | 15 | 25.0 | 25.0    | 5    | 7                | 5    | 6   | 51.9             | 127     | 139  | 5  | 6   | 35.0    | 39.0 | 5         | 12                           | 5  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 10                  | 12 | 11 | 9  | 5             | 7.5  | 5       | 6    | 48.3 | 30.0             | 30.0    | 5    | 13 | 36.0 | 39.0    | 5    | 13 | 24.0 | 25.0    | 5    | 6.5              | 5    | 6   | 52.3             | 128     | 140  | 5  | 6   | 35.0    | 39.0 | 5         | 12                           | 5  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 11                  | 13 | 11 | 9  | 5             | 7.5  | 5       | 6.5  | 48.6 | 31.0             | 31.0    | 5    | 14 | 36.0 | 39.0    | 5    | 14 | 24.0 | 25.0    | 5    | 6.5              | 6    | 7   | 55.0             | 129     | 141  | 6  | 8   | 38.0    | 42.0 | 5         | 12                           | 5  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 12                  | 14 | 11 | 9  | 5             | 7    | 5       | 6    | 48.8 | 32.0             | 32.0    | 5    | 13 | 35.0 | 39.0    | 5    | 13 | 24.0 | 25.0    | 5    | 6.5              | 6    | 7   | 54.9             | 130     | 142  | 6  | 8   | 38.0    | 43.0 | 5         | 12                           | 5  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 13                  | 15 | 11 | 9  | 5             | 6.5  | 6       | 8    | 52.1 | 33.0             | 37.0    | 5    | 12 | 35.0 | 39.0    | 5    | 12 | 23.0 | 24.0    | 5    | 6                | 6    | 7   | 54.9             | 131     | 143  | 6  | 8   | 38.0    | 43.0 | 5         | 12                           | 5  | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 13                  | 15 | 12 | 9  | 5             | 6.5  | 5       | 6    | 48.3 | 33.0             | 33.0    | 5    | 12 | 35.0 | 38.0    | 5    | 12 | 23.0 | 25.0    | 5    | 6                | 6    | 7.5 | 53.9             | 131     | 143  | 6  | 7   | 38.0    | 43.0 | 5         | 12                           | 5  | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 14                  | 16 | 12 | 9  | 5             | 6    | 6       | 8    | 51.8 | 34.0             | 38.0    | 5    | 12 | 35.0 | 38.0    | 5    | 12 | 22.0 | 24.0    | 5    | 6                | 6    | 7.5 | 54.1             | 132     | 144  | 6  | 7.5 | 38.0    | 43.0 | 5         | 12                           | 5  | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 15                  | 16 | 12 | 9  | 5             | 6    | 6       | 8    | 56.1 | 35.0             | 39.0    | 6    | 16 | 43.0 | 47.0    | 6    | 16 | 31.0 | 32.0    | 6    | 7.5              | 6    | 8   | 51.0             | 132     | 144  | 6  | 7   | 38.0    | 43.0 | 5         | 12                           | 5  | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 15                  | 17 | 12 | 9  | 6             | 8    | 6       | 7    | 55.9 | 35.0             | 39.0    | 6    | 16 | 43.0 | 47.0    | 6    | 16 | 31.0 | 32.0    | 6    | 8                | 6    | 7.5 | 51.5             | 133     | 145  | 6  | 7   | 38.0    | 43.0 | 5         | 12                           | 5  | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 16                  | 18 | 13 | 9  | 6             | 8    | 6       | 8    | 56.5 | 36.0             | 40.0    | 6    | 15 | 42.0 | 47.0    | 6    | 15 | 30.0 | 31.0    | 6    | 8                | 6    | 8.5 | 51.8             | 134     | 146  | 6  | 7   | 38.0    | 43.0 | 5         | 12                           | 5  | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 17                  | 19 | 13 | 9  | 6             | 8    | 6       | 7.5  | 56.9 | 37.0             | 41.0    | 6    | 14 | 42.0 | 47.0    | 6    | 14 | 30.0 | 31.0    | 6    | 8                | 6    | 8.5 | 52.3             | 135     | 147  | 6  | 7   | 38.0    | 43.0 | 5         | 12                           | 5  | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 17                  | 19 | 14 | 9  | 6             | 7.5  | 6       | 7.5  | 57.0 | 37.0             | 41.0    | 6    | 14 | 42.0 | 46.0    | 6    | 14 | 30.0 | 31.0    | 6    | 7.5              | 6    | 8   | 51.9             | 135     | 147  | 6  | 6.5 | 38.0    | 43.0 | 5         | 12                           | 5  | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 18                  | 20 | 14 | 9  | 6             | 7.5  | 6       | 7.5  | 57.4 | 38.0             | 42.0    | 6    | 14 | 42.0 | 46.0    | 6    | 14 | 30.0 | 31.0    | 6    | 7.5              | 6    | 8   | 52.3             | 136     | 148  | 6  | 7   | 38.0    | 43.0 | 5         | 12                           | 5  | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 18                  | 20 | 14 | 9  | 6             | 7    | 6       | 6.5  | 57.3 | 38.0             | 42.0    | 6    | 13 | 42.0 | 46.0    | 6    | 13 | 30.0 | 31.0    | 6    | 6.5              | 6    | 8   | 52.1             | 136     | 148  | 6  | 6.5 | 38.0    | 43.0 | 5         | 12                           | 5  | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 19                  | 21 | 15 | 9  | 6             | 7    | 6       | 7    | 57.9 | 43.0             | 43.0    | 6    | 14 | 42.0 | 46.0    | 6    | 14 | 30.0 | 30.0    | 6    | 7                | 6    | 8   | 52.6             | 137     | 149  | 6  | 6.5 | 38.0    | 43.0 | 5         | 12                           | 6  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 19                  | 22 | 15 | 9  | 6             | 7    | 6       | 7    | 57.9 | 43.0             | 43.0    | 6    | 13 | 42.0 | 46.0    | 6    | 13 | 30.0 | 30.0    | 6    | 7                | 6    | 8   | 53.0             | 138     | 150  | 6  | 6.5 | 38.0    | 43.0 | 5         | 12                           | 6  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 20                  | 22 | 15 | 9  | 6             | 7    | 6       | 6    | 58.1 | 44.0             | 44.0    | 6    | 14 | 42.0 | 45.0    | 6    | 14 | 30.0 | 30.0    | 6    | 7                | 6    | 7.5 | 52.9             | 138     | 150  | 6  | 6.5 | 38.0    | 43.0 | 5         | 12                           | 6  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 20                  | 23 | 16 | 9  | 6             | 6.5  | 6       | 7    | 58.5 | 44.0             | 44.0    | 6    | 13 | 42.0 | 45.0    | 6    | 13 | 30.0 | 30.0    | 6    | 7                | 6    | 7.5 | 53.3             | 139     | 151  | 6  | 6.5 | 38.0    | 44.0 | 5         | 12                           | 6  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 21                  | 23 | 16 | 9  | 6             | 6.5  | 6       | 6.5  | 58.9 | 45.0             | 45.0    | 6    | 13 | 42.0 | 45.0    | 6    | 13 | 29.0 | 30.0    | 6    | 6.5              | 6    | 7.5 | 53.3             | 139     | 151  | 6  | 6   | 38.0    | 44.0 | 5         | 12                           | 6  | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**CONCRETE TRIPLE BOX CULVERT**  
MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS  
SPAN (S): 8 FEET  
HEIGHT (HT): 10 THRU 11 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.87A

SHEET NO.  
11 OF 27

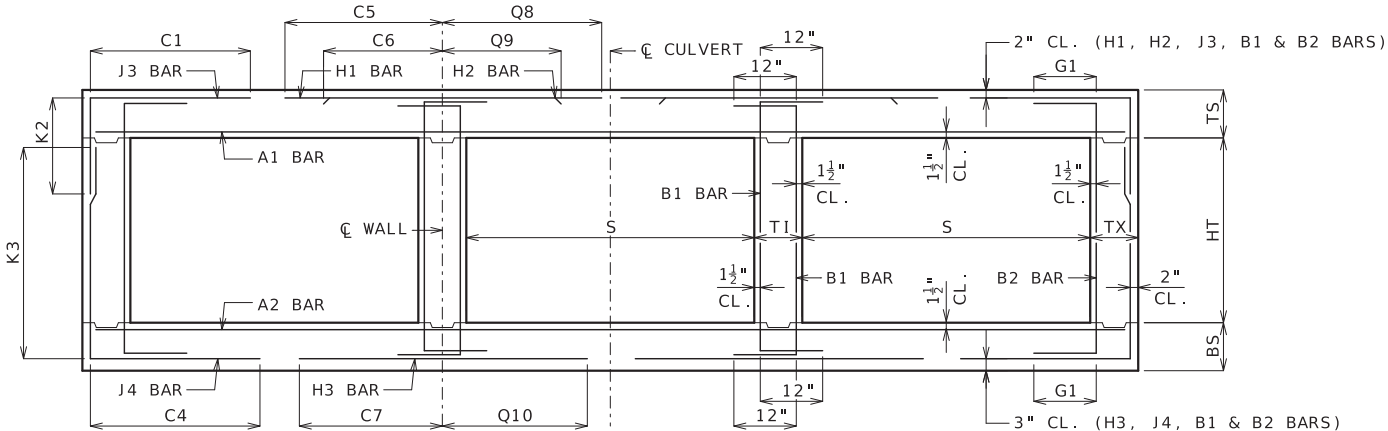
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.





| SPAN (S) = 9 FT |                     |    |    |    |               |      |         |      |      |        |         |      |      |      |         |      |      |      |         |      |                  |      |      |      |         |        |      |      |         |      |           | HEIGHT (HT) = 11 FT OR 12 FT |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|---------------------|----|----|----|---------------|------|---------|------|------|--------|---------|------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|--------|------|------|---------|------|-----------|------------------------------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL  | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |         |      |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |        |      |      |         |      | WALL BARS |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |        | H1 BARS |      |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |        |      |      | B1 BARS |      | B2 BARS   |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                 | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |         | SIZE | SPA. | C5   | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |        | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                         | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                 |                     |    |    |    |               |      |         |      |      | HT=11' | HT=12'  |      |      |      |         |      |      |      |         |      |                  |      |      |      | HT=11'  | HT=12' |      |      |         |      |           |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT            | 13                  | 9  | 9  | 10 | 5             | 6.5  | 5       | 7.5  | 49.3 | 33.0   | 33.0    | 4    | 12   | 90.5 | 67.5    | 4    | 12   | 29.0 | 27.0    | 4    | 6                | 6    | 6    | 76.3 | 137     | 149    | 5    | 6.5  | 44.0    | 44.0 | 5         | 10                           | 5    | 9    | 2  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT            | 13                  | 10 | 9  | 10 | 5             | 6.5  | 5       | 7    | 52.3 | 33.0   | 33.0    | 5    | 18   | 92.5 | 69.5    | 5    | 18   | 28.0 | 25.0    | 4    | 6                | 6    | 6.5  | 76.3 | 138     | 150    | 5    | 7    | 44.0    | 45.0 | 5         | 11.5                         | 5    | 9    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'         | 13                  | 10 | 9  | 10 | 5             | 6.5  | 5       | 6    | 52.3 | 33.0   | 33.0    | 5    | 16   | 92.5 | 71.0    | 5    | 16   | 29.0 | 30.0    | 5    | 8.5              | 6    | 6    | 76.3 | 138     | 150    | 5    | 7    | 44.0    | 45.0 | 5         | 11.5                         | 5    | 8.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT            | 9                   | 10 | 9  | 10 | 5             | 8.5  | 5       | 6    | 52.3 | 29.0   | 29.0    | 5    | 16   | 92.5 | 71.0    | 5    | 16   | 29.0 | 30.0    | 5    | 8.5              | 6    | 6    | 76.3 | 138     | 150    | 5    | 7    | 43.0    | 45.0 | 5         | 11.5                         | 5    | 8.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT            | 9                   | 10 | 10 | 10 | 5             | 8.5  | 5       | 6    | 69.4 | 29.0   | 29.0    | 5    | 16   | 51.0 | 49.0    | 5    | 16   | 28.0 | 28.0    | 5    | 7.5              | 6    | 6.5  | 68.8 | 138     | 150    | 5    | 6    | 41.0    | 43.0 | 5         | 12                           | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT            | 9                   | 10 | 10 | 10 | 5             | 8.5  | 5       | 6    | 60.0 | 29.0   | 29.0    | 5    | 14   | 45.0 | 45.0    | 5    | 14   | 27.0 | 27.0    | 5    | 7                | 6    | 6    | 63.9 | 138     | 150    | 6    | 7    | 43.0    | 45.0 | 5         | 12                           | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT           | 9                   | 11 | 10 | 10 | 5             | 8.5  | 6       | 7    | 59.0 | 29.0   | 33.0    | 5    | 13   | 42.0 | 43.0    | 5    | 13   | 27.0 | 27.0    | 5    | 6.5              | 6    | 6    | 63.6 | 139     | 151    | 5    | 6    | 39.0    | 43.0 | 5         | 12                           | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT           | 10                  | 12 | 10 | 10 | 5             | 8    | 6       | 7    | 58.6 | 30.0   | 34.0    | 5    | 13   | 41.0 | 43.0    | 5    | 13   | 26.0 | 27.0    | 5    | 6.5              | 6    | 6.5  | 62.8 | 140     | 152    | 5    | 6    | 39.0    | 43.0 | 5         | 12                           | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT           | 11                  | 12 | 10 | 10 | 5             | 7.5  | 6       | 7.5  | 58.5 | 31.0   | 35.0    | 5    | 13   | 41.0 | 43.0    | 5    | 13   | 26.0 | 27.0    | 5    | 6                | 6    | 6    | 60.4 | 140     | 152    | 6    | 7    | 41.0    | 45.0 | 5         | 12                           | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT           | 12                  | 13 | 11 | 10 | 5             | 7    | 5       | 6    | 54.4 | 32.0   | 32.0    | 5    | 13   | 40.0 | 42.0    | 5    | 13   | 26.0 | 27.0    | 5    | 6                | 6    | 7    | 59.1 | 141     | 153    | 6    | 7    | 41.0    | 45.0 | 5         | 12                           | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT           | 12                  | 14 | 11 | 10 | 5             | 7    | 6       | 7.5  | 55.6 | 32.0   | 36.0    | 5    | 12   | 39.0 | 42.0    | 5    | 12   | 26.0 | 27.0    | 6    | 8                | 6    | 6.5  | 59.0 | 142     | 154    | 6    | 7.5  | 41.0    | 46.0 | 5         | 12                           | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT           | 13                  | 15 | 12 | 10 | 5             | 6.5  | 6       | 8    | 55.0 | 33.0   | 37.0    | 5    | 12   | 38.0 | 42.0    | 5    | 12   | 26.0 | 27.0    | 6    | 8                | 6    | 7    | 58.1 | 143     | 155    | 6    | 7    | 41.0    | 46.0 | 5         | 12                           | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT           | 14                  | 16 | 12 | 10 | 5             | 6    | 6       | 7.5  | 55.0 | 34.0   | 38.0    | 5    | 12   | 38.0 | 42.0    | 5    | 12   | 25.0 | 27.0    | 6    | 7.5              | 6    | 7    | 57.9 | 144     | 156    | 6    | 7    | 41.0    | 46.0 | 5         | 12                           | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT           | 15                  | 17 | 13 | 10 | 6             | 8    | 6       | 7.5  | 61.0 | 35.0   | 39.0    | 6    | 16   | 47.0 | 51.0    | 6    | 16   | 33.0 | 35.0    | 6    | 7.5              | 6    | 7.5  | 57.4 | 145     | 157    | 6    | 6.5  | 41.0    | 46.0 | 5         | 12                           | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT           | 16                  | 17 | 13 | 10 | 6             | 8    | 6       | 7    | 61.3 | 40.0   | 40.0    | 6    | 15   | 46.0 | 51.0    | 6    | 15   | 33.0 | 34.0    | 6    | 6.5              | 6    | 7    | 56.6 | 145     | 157    | 6    | 6.5  | 41.0    | 46.0 | 5         | 12                           | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT           | 16                  | 18 | 14 | 10 | 6             | 8    | 6       | 7.5  | 61.0 | 36.0   | 40.0    | 6    | 15   | 46.0 | 51.0    | 6    | 15   | 33.0 | 35.0    | 6    | 7                | 6    | 7    | 56.6 | 146     | 158    | 6    | 6.5  | 41.0    | 46.0 | 5         | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT           | 17                  | 19 | 14 | 10 | 6             | 7.5  | 6       | 7.5  | 59.6 | 37.0   | 41.0    | 6    | 14   | 45.0 | 50.0    | 6    | 14   | 32.0 | 34.0    | 6    | 7                | 6    | 7.5  | 54.8 | 147     | 159    | 6    | 6    | 41.0    | 46.0 | 5         | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT           | 18                  | 20 | 14 | 10 | 6             | 7    | 6       | 7    | 59.9 | 38.0   | 42.0    | 6    | 13   | 45.0 | 50.0    | 6    | 13   | 32.0 | 33.0    | 6    | 7                | 6    | 7.5  | 55.0 | 148     | 160    | 6    | 6    | 41.0    | 46.0 | 5         | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT           | 18                  | 20 | 14 | 10 | 6             | 6.5  | 6       | 6.5  | 59.8 | 38.0   | 42.0    | 6    | 13   | 45.0 | 50.0    | 6    | 13   | 32.0 | 34.0    | 6    | 6                | 6    | 7.5  | 54.9 | 148     | 160    | 6    | 6    | 41.0    | 46.0 | 5         | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT           | 19                  | 21 | 15 | 10 | 6             | 6.5  | 6       | 7    | 60.3 | 43.0   | 43.0    | 6    | 13   | 45.0 | 50.0    | 6    | 13   | 31.0 | 33.0    | 6    | 6.5              | 6    | 7.5  | 55.3 | 149     | 161    | 6    | 6    | 41.0    | 47.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT           | 20                  | 22 | 15 | 10 | 6             | 6.5  | 6       | 6.5  | 60.6 | 44.0   | 44.0    | 6    | 12   | 45.0 | 50.0    | 6    | 12   | 31.0 | 32.0    | 6    | 6.5              | 6    | 7.5  | 55.5 | 150     | 162    | 6    | 6    | 41.0    | 47.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT           | 20                  | 23 | 16 | 10 | 6             | 6.5  | 6       | 6.5  | 60.9 | 44.0   | 44.0    | 6    | 12   | 45.0 | 49.0    | 6    | 12   | 31.0 | 32.0    | 6    | 6.5              | 6    | 7.5  | 55.9 | 151     | 163    | 6    | 6    | 41.0    | 47.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT           | 21                  | 23 | 16 | 10 | 6             | 6.5  | 6       | 6.5  | 61.1 | 45.0   | 45.0    | 6    | 12   | 45.0 | 49.0    | 6    | 12   | 31.0 | 32.0    | 6    | 6                | 6    | 7.5  | 55.8 | 151     | 163    | 7    | 7.5  | 44.0    | 50.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT           | 22                  | 24 | 17 | 10 | 6             | 6    | 6       | 6.5  | 61.9 | 46.0   | 46.0    | 6    | 12   | 45.0 | 49.0    | 6    | 12   | 31.0 | 32.0    | 6    | 6                | 6    | 7    | 56.3 | 152     | 164    | 7    | 7.5  | 44.0    | 50.0 | 5         | 12                           | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT           | 22                  | 25 | 17 | 10 | 6             | 6    | 6       | 6    | 61.9 | 46.0   | 46.0    | 6    | 12   | 45.0 | 48.0    | 6    | 12   | 31.0 | 32.0    | 6    | 6                | 6    | 7    | 56.5 | 153     | 165    | 7    | 8    | 44.0    | 50.0 | 5         | 12                           | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT           | 23                  | 26 | 18 | 10 | 6             | 6    | 6       | 6.5  | 62.5 | 47.0   | 47.0    | 6    | 12   | 44.0 | 48.0    | 6    | 12   | 31.0 | 31.0    | 6    | 6                | 6    | 6.5  | 57.0 | 154     | 166    | 7    | 8    | 44.0    | 50.0 | 5         | 12                           | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT           | 23                  | 26 | 18 | 10 | 7             | 8    | 6       | 6    | 62.5 | 47.0   | 47.0    | 6    | 12   | 44.0 | 48.0    | 6    | 12   | 31.0 | 31.0    | 6    | 6                | 6    | 6.5  | 56.9 | 154     | 166    | 7    | 7.5  | 44.0    | 50.0 | 5         | 12                           | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



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**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**CONCRETE TRIPLE BOX CULVERT**

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 9 FEET  
HEIGHT (HT): 11 THRU 12 FEET

|                 |           |         |                       |
|-----------------|-----------|---------|-----------------------|
| DATE EFFECTIVE: | 7/1/2023  | 703.87A | SHEET NO.<br>13 OF 27 |
| DATE PREPARED:  | 3/22/2023 |         |                       |

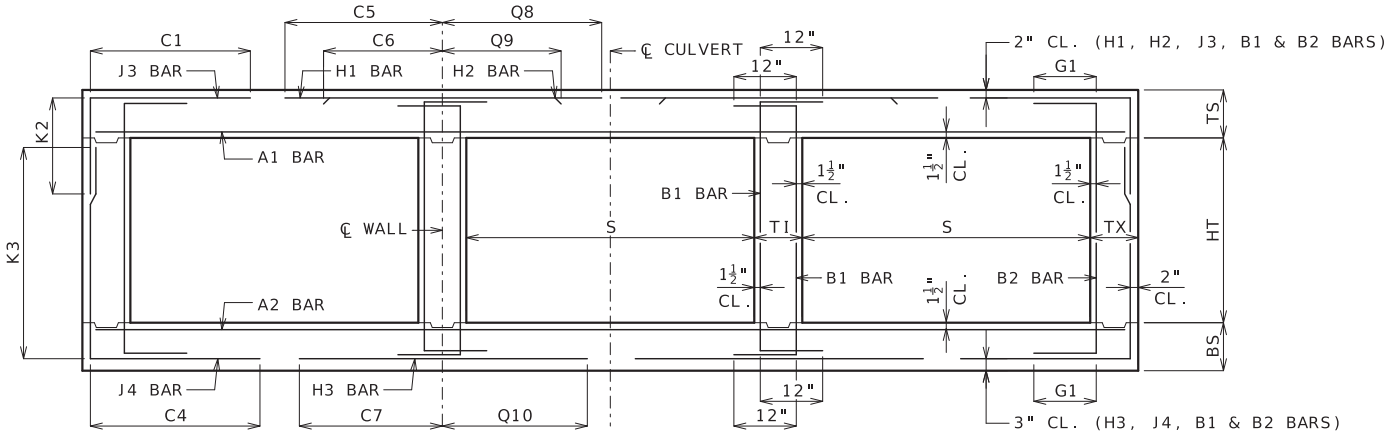
| SPAN (S) = 10 FT |                  |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         |      | HEIGHT (HT) = 5 FT OR 6 FT OR 7 FT |      |           |      |      |      |    |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------|------------------------------------|------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |      |                                    |      | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |      | B2 BARS                            |      |           |      |      |      |    |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA. | C7                                 | Q10  | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=5' | HT=6'   | HT=7' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=5' | HT=6' | HT=7' |         |      |                                    |      |           |      |      |      |    |  |  |  |  |  |  |  |  |
| 1 FT             | 13               | 9  | 8  | 8  | 5             | 6.5  | 4       | 7    | 51.9 | 29.0  | 29.0    | 29.0  | 5    | 16   | 98.5    | 74.5 | 5    | 16   | 29.0    | 27.0 | 4                | 6    | 4    | 6    | 47.4    | 65    | 77    | 89    | 5       | 6.5  | 45.0                               | 47.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 2 FT             | 13               | 9  | 8  | 8  | 5             | 6.5  | 4       | 6.5  | 51.9 | 29.0  | 29.0    | 29.0  | 5    | 14   | 98.5    | 74.5 | 5    | 14   | 28.0    | 29.0 | 5                | 8.5  | 5    | 6.5  | 43.3    | 65    | 77    | 89    | 5       | 6    | 44.0                               | 46.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 2' - 4'          | 13               | 9  | 8  | 8  | 5             | 6.5  | 6       | 7.5  | 51.9 | 29.0  | 29.0    | 29.0  | 5    | 13   | 98.5    | 76.0 | 5    | 13   | 30.0    | 30.0 | 5                | 7.5  | 5    | 6.5  | 43.3    | 65    | 77    | 89    | 6       | 6.5  | 46.0                               | 49.0 | 5         | 10   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 4 FT             | 9                | 9  | 8  | 8  | 5             | 7.5  | 6       | 7.5  | 48.4 | 25.0  | 29.0    | 29.0  | 5    | 13   | 59.0    | 76.0 | 5    | 13   | 30.0    | 30.0 | 5                | 7.5  | 5    | 6.5  | 39.0    | 65    | 77    | 89    | 6       | 6.5  | 46.0                               | 49.0 | 5         | 10   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 6 FT             | 9                | 9  | 8  | 8  | 5             | 8    | 5       | 6    | 39.8 | 29.0  | 29.0    | 29.0  | 5    | 13   | 49.0    | 55.0 | 5    | 13   | 28.0    | 29.0 | 5                | 7.5  | 6    | 7    | 39.8    | 65    | 77    | 89    | 6       | 6    | 45.0                               | 48.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 8 FT             | 10               | 10 | 8  | 8  | 5             | 8    | 5       | 7.5  | 36.8 | 26.0  | 26.0    | 30.0  | 5    | 13   | 45.0    | 50.0 | 5    | 13   | 28.0    | 28.0 | 5                | 7    | 5    | 6.5  | 34.8    | 66    | 78    | 90    | 6       | 6.5  | 44.0                               | 48.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 10 FT            | 10               | 11 | 8  | 8  | 5             | 8    | 5       | 6.5  | 35.4 | 26.0  | 26.0    | 30.0  | 6    | 15   | 47.0    | 51.0 | 6    | 15   | 30.0    | 31.0 | 5                | 6.5  | 5    | 7.5  | 32.9    | 67    | 79    | 91    | 6       | 6.5  | 43.0                               | 49.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 12 FT            | 11               | 12 | 8  | 8  | 5             | 7.5  | 5       | 7    | 33.6 | 27.0  | 27.0    | 31.0  | 6    | 16   | 45.0    | 50.0 | 6    | 16   | 30.0    | 31.0 | 5                | 6    | 5    | 8.5  | 31.6    | 68    | 80    | 92    | 6       | 6.5  | 42.0                               | 49.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 14 FT            | 12               | 13 | 8  | 8  | 5             | 7    | 5       | 8    | 32.4 | 28.0  | 28.0    | 32.0  | 6    | 16   | 44.0    | 50.0 | 6    | 16   | 29.0    | 31.0 | 5                | 6    | 5    | 8.5  | 30.9    | 69    | 81    | 93    | 6       | 6.5  | 42.0                               | 49.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 16 FT            | 13               | 14 | 8  | 8  | 5             | 6.5  | 5       | 8    | 31.3 | 29.0  | 29.0    | 33.0  | 6    | 16   | 44.0    | 50.0 | 6    | 16   | 29.0    | 31.0 | 6                | 8    | 5    | 8.5  | 30.3    | 70    | 82    | 94    | 6       | 7    | 42.0                               | 49.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 18 FT            | 14               | 15 | 8  | 8  | 5             | 6    | 5       | 8.5  | 30.5 | 30.0  | 30.0    | 34.0  | 6    | 16   | 43.0    | 50.0 | 6    | 16   | 29.0    | 31.0 | 6                | 7.5  | 5    | 8.5  | 29.8    | 71    | 83    | 95    | 6       | 7    | 41.0                               | 49.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 20 FT            | 15               | 16 | 8  | 8  | 6             | 8    | 5       | 8    | 34.9 | 31.0  | 31.0    | 35.0  | 6    | 16   | 48.0    | 56.0 | 6    | 16   | 35.0    | 37.0 | 6                | 7    | 5    | 8    | 29.4    | 72    | 84    | 96    | 6       | 7    | 41.0                               | 49.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 22 FT            | 16               | 17 | 8  | 8  | 6             | 8    | 5       | 7    | 34.4 | 32.0  | 32.0    | 36.0  | 6    | 15   | 48.0    | 56.0 | 6    | 15   | 34.0    | 37.0 | 6                | 7    | 5    | 7    | 29.0    | 73    | 85    | 97    | 6       | 6.5  | 41.0                               | 50.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 24 FT            | 17               | 18 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 34.0 | 37.0  | 37.0    | 37.0  | 6    | 14   | 48.0    | 56.0 | 6    | 14   | 34.0    | 36.0 | 6                | 6.5  | 5    | 6.5  | 28.9    | 74    | 86    | 98    | 6       | 6.5  | 41.0                               | 50.0 | 5         | 12   | 5    | 11   | 0  |  |  |  |  |  |  |  |  |
| 26 FT            | 18               | 19 | 8  | 8  | 6             | 7    | 5       | 6.5  | 33.9 | 38.0  | 38.0    | 38.0  | 6    | 13   | 47.0    | 55.0 | 6    | 13   | 33.0    | 35.0 | 6                | 6.5  | 5    | 6.5  | 28.8    | 75    | 87    | 99    | 6       | 6    | 41.0                               | 50.0 | 5         | 12   | 5    | 10   | 0  |  |  |  |  |  |  |  |  |
| 28 FT            | 19               | 20 | 8  | 8  | 6             | 6.5  | 5       | 6    | 33.8 | 39.0  | 39.0    | 39.0  | 6    | 13   | 47.0    | 55.0 | 6    | 13   | 33.0    | 35.0 | 6                | 6.5  | 5    | 6    | 28.8    | 76    | 88    | 100   | 6       | 6    | 41.0                               | 50.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 30 FT            | 19               | 21 | 8  | 8  | 6             | 6    | 5       | 6    | 33.8 | 39.0  | 39.0    | 39.0  | 6    | 12   | 47.0    | 55.0 | 6    | 12   | 33.0    | 36.0 | 6                | 6    | 6    | 7.5  | 31.6    | 77    | 89    | 101   | 7       | 7.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 32 FT            | 20               | 22 | 8  | 8  | 6             | 6.5  | 6       | 7.5  | 37.8 | 44.0  | 44.0    | 44.0  | 6    | 12   | 47.0    | 55.0 | 6    | 12   | 33.0    | 35.0 | 6                | 6    | 6    | 7    | 31.8    | 78    | 90    | 102   | 7       | 7.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 34 FT            | 21               | 23 | 8  | 8  | 6             | 6    | 6       | 7    | 36.8 | 45.0  | 45.0    | 45.0  | 6    | 12   | 46.0    | 55.0 | 6    | 12   | 32.0    | 34.0 | 6                | 6    | 6    | 6.5  | 30.9    | 79    | 91    | 103   | 7       | 7.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 36 FT            | 22               | 23 | 8  | 8  | 6             | 6    | 6       | 6.5  | 36.8 | 46.0  | 46.0    | 46.0  | 7    | 15   | 51.0    | 60.0 | 7    | 15   | 36.0    | 38.0 | 6                | 6    | 6    | 6.5  | 31.0    | 79    | 91    | 103   | 7       | 7    | 44.0                               | 53.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 38 FT            | 23               | 24 | 8  | 8  | 7             | 7.5  | 6       | 6    | 36.8 | 47.0  | 47.0    | 47.0  | 7    | 15   | 51.0    | 59.0 | 7    | 15   | 36.0    | 37.0 | 6                | 6    | 6    | 6    | 31.1    | 80    | 92    | 104   | 7       | 7    | 44.0                               | 53.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |
| 40 FT            | 23               | 25 | 8  | 8  | 7             | 7.5  | 6       | 6    | 36.9 | 47.0  | 47.0    | 47.0  | 7    | 15   | 51.0    | 59.0 | 7    | 15   | 36.0    | 38.0 | 6                | 6    | 6    | 6    | 31.1    | 81    | 93    | 105   | 7       | 7    | 44.0                               | 53.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 42 FT            | 24               | 26 | 8  | 8  | 7             | 7.5  | 6       | 6    | 37.0 | 48.0  | 48.0    | 48.0  | 7    | 14   | 51.0    | 59.0 | 7    | 14   | 36.0    | 37.0 | 7                | 8    | 7    | 6.5  | 34.4    | 82    | 94    | 106   | 7       | 7    | 44.0                               | 53.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 44 FT            | 25               | 26 | 9  | 8  | 7             | 7    | 6       | 6.5  | 37.8 | 49.0  | 49.0    | 49.0  | 7    | 14   | 51.0    | 59.0 | 7    | 14   | 36.0    | 37.0 | 7                | 7.5  | 6    | 6.5  | 32.0    | 82    | 94    | 106   | 7       | 7    | 44.0                               | 53.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |
| 46 FT            | 25               | 27 | 9  | 8  | 7             | 7    | 6       | 6.5  | 37.9 | 49.0  | 49.0    | 49.0  | 7    | 14   | 51.0    | 59.0 | 7    | 14   | 36.0    | 37.0 | 7                | 7.5  | 6    | 6.5  | 32.0    | 83    | 95    | 107   | 7       | 7    | 44.0                               | 53.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 48 FT            | 26               | 28 | 9  | 8  | 7             | 7    | 6       | 6.5  | 38.0 | 50.0  | 50.0    | 50.0  | 7    | 14   | 51.0    | 58.0 | 7    | 14   | 35.0    | 37.0 | 7                | 7.5  | 6    | 6    | 32.3    | 84    | 96    | 108   | 7       | 7    | 44.0                               | 53.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 50 FT            | 27               | 28 | 9  | 8  | 7             | 7    | 6       | 6    | 38.0 | 51.0  | 51.0    | 51.0  | 7    | 14   | 51.0    | 58.0 | 7    | 14   | 35.0    | 37.0 | 7                | 7    | 6    | 6    | 32.4    | 84    | 96    | 108   | 7       | 6.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |

| SPAN (S) = 10 FT |                  |    |    |    |               |      |         |      |      |       |       |        |         |      |    |       |         |      |    |    |                  |      |         |      |     |       |       | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |         |      |     |     |           |      |         |      |    |    |    |     |      |    |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|--------|---------|------|----|-------|---------|------|----|----|------------------|------|---------|------|-----|-------|-------|-------------------------------------|---------|------|-----|-----|-----------|------|---------|------|----|----|----|-----|------|----|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |        |         |      |    |       |         |      |    |    | BOTTOM SLAB BARS |      |         |      |     |       |       |                                     |         |      |     |     | WALL BARS |      |         |      |    |    |    |     |      |    |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |        | H1 BARS |      |    |       | H2 BARS |      |    |    | A2 BARS          |      | J4 BARS |      |     |       |       |                                     | H3 BARS |      |     |     | B1 BARS   |      | B2 BARS |      |    |    |    |     |      |    |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |        | SIZE    | SPA. | C5 | Q8    | SIZE    | SPA. | C6 | Q9 | SIZE             | SPA. | SIZE    | SPA. | C4  | K3    |       |                                     | SIZE    | SPA. | C7  | Q10 | SIZE      | SPA. | SIZE    | SPA. | G1 |    |    |     |      |    |
|                  |                  |    |    |    |               |      |         |      |      | HT=8' | HT=9' | HT=10' |         |      |    |       |         |      |    |    |                  |      |         |      |     | HT=8' | HT=9' | HT=10'                              |         |      |     |     |           |      |         |      |    |    |    |     |      |    |
| 1 FT             | 13               | 9  | 8  | 8  | 5             | 6.5  | 5       | 8.5  | 54.9 | 29.0  | 33.0  | 33.0   | 5       | 5    | 16 | 100.5 | 74.5    | 5    | 5  | 16 | 30.0             | 30.0 | 5       | 5    | 8.5 | 6     | 6.5   | 74.1                                | 101     | 113  | 125 | 5   | 5         | 6    | 46.0    | 47.0 | 5  | 5  | 12 | 5   | 12   | 12 |
| 2 FT             | 13               | 9  | 8  | 8  | 5             | 6.5  | 5       | 8    | 54.9 | 29.0  | 33.0  | 33.0   | 5       | 5    | 14 | 100.5 | 74.5    | 5    | 5  | 14 | 28.0             | 28.0 | 5       | 5    | 7.5 | 6     | 6     | 65.8                                | 101     | 113  | 125 | 6   | 6         | 7    | 47.0    | 50.0 | 5  | 5  | 12 | 5   | 11.5 | 12 |
| 2'- 4'           | 13               | 9  | 9  | 8  | 5             | 6.5  | 5       | 6    | 65.9 | 29.0  | 33.0  | 33.0   | 5       | 5    | 13 | 100.5 | 76.0    | 5    | 5  | 13 | 30.0             | 31.0 | 5       | 5    | 7.5 | 6     | 6     | 65.8                                | 101     | 113  | 125 | 6   | 6         | 6.5  | 47.0    | 50.0 | 5  | 5  | 12 | 5   | 11.5 | 12 |
| 4 FT             | 9                | 9  | 9  | 8  | 5             | 7    | 5       | 6    | 65.9 | 29.0  | 29.0  | 29.0   | 5       | 5    | 13 | 74.0  | 76.0    | 5    | 5  | 13 | 30.0             | 31.0 | 5       | 5    | 7.5 | 6     | 6.5   | 57.6                                | 101     | 113  | 125 | 6   | 6         | 6.5  | 46.0    | 50.0 | 5  | 5  | 12 | 5   | 11.5 | 12 |
| 6 FT             | 9                | 9  | 9  | 8  | 5             | 8    | 5       | 6    | 51.8 | 29.0  | 29.0  | 29.0   | 5       | 5    | 13 | 51.0  | 57.0    | 5    | 5  | 13 | 29.0             | 29.0 | 5       | 5    | 7   | 6     | 6     | 52.9                                | 101     | 113  | 125 | 6   | 6         | 6    | 45.0    | 48.0 | 5  | 5  | 12 | 5   | 11.5 | 12 |
| 8 FT             | 9                | 10 | 9  | 8  | 5             | 8    | 5       | 6    | 48.1 | 29.0  | 29.0  | 29.0   | 6       | 6    | 15 | 49.0  | 52.0    | 6    | 6  | 15 | 30.0             | 31.0 | 5       | 5    | 7   | 6     | 6.5   | 51.0                                | 102     | 114  | 126 | 6   | 6         | 6    | 44.0    | 49.0 | 5  | 5  | 12 | 5   | 11   | 0  |
| 10 FT            | 10               | 11 | 9  | 8  | 5             | 8    | 5       | 6    | 46.5 | 30.0  | 30.0  | 30.0   | 5       | 5    | 12 | 44.0  | 48.0    | 5    | 5  | 12 | 27.0             | 28.0 | 5       | 5    | 6.5 | 6     | 6.5   | 49.5                                | 103     | 115  | 127 | 6   | 6         | 6.5  | 43.0    | 49.0 | 5  | 5  | 12 | 5   | 10.5 | 0  |
| 12 FT            | 11               | 12 | 9  | 8  | 5             | 7.5  | 6       | 7    | 48.1 | 31.0  | 31.0  | 35.0   | 6       | 6    | 16 | 45.0  | 50.0    | 6    | 6  | 16 | 30.0             | 31.0 | 5       | 5    | 6   | 6     | 6.5   | 48.4                                | 104     | 116  | 128 | 6   | 6         | 6.5  | 43.0    | 49.0 | 5  | 5  | 12 | 5   | 9.5  | 0  |
| 14 FT            | 12               | 13 | 9  | 8  | 5             | 7    | 6       | 7    | 47.0 | 32.0  | 32.0  | 36.0   | 6       | 6    | 16 | 45.0  | 50.0    | 6    | 6  | 16 | 29.0             | 31.0 | 5       | 5    | 6   | 6     | 7     | 47.4                                | 105     | 117  | 129 | 6   | 6         | 6.5  | 42.0    | 49.0 | 5  | 5  | 12 | 5   | 8.5  | 0  |
| 16 FT            | 13               | 14 | 9  | 8  | 5             | 6.5  | 6       | 7    | 46.0 | 33.0  | 33.0  | 37.0   | 6       | 6    | 16 | 44.0  | 50.0    | 6    | 6  | 16 | 29.0             | 31.0 | 6       | 6    | 8   | 6     | 7     | 46.5                                | 106     | 118  | 130 | 6   | 7         | 7    | 42.0    | 49.0 | 5  | 5  | 12 | 5   | 8.5  | 0  |
| 18 FT            | 14               | 15 | 9  | 8  | 5             | 6    | 6       | 7    | 45.3 | 34.0  | 34.0  | 38.0   | 6       | 6    | 16 | 43.0  | 49.0    | 6    | 6  | 16 | 29.0             | 31.0 | 6       | 6    | 7.5 | 6     | 7     | 45.9                                | 107     | 119  | 131 | 6   | 7         | 7    | 42.0    | 49.0 | 5  | 5  | 12 | 5   | 8.5  | 0  |
| 20 FT            | 15               | 16 | 9  | 8  | 6             | 8    | 6       | 7    | 50.5 | 35.0  | 35.0  | 39.0   | 6       | 6    | 16 | 49.0  | 55.0    | 6    | 6  | 16 | 35.0             | 37.0 | 6       | 7    | 6   | 6.5   | 45.3  | 108                                 | 120     | 132  | 6   | 7   | 7         | 42.0 | 49.0    | 5    | 5  | 12 | 5  | 8.5 | 0    |    |
| 22 FT            | 15               | 17 | 11 | 8  | 6             | 7.5  | 5       | 6    | 47.1 | 35.0  | 35.0  | 35.0   | 6       | 6    | 15 | 48.0  | 55.0    | 6    | 6  | 15 | 35.0             | 37.0 | 6       | 7    | 5   | 7     | 42.1  | 109                                 | 121     | 133  | 6   | 6   | 6.5       | 42.0 | 50.0    | 5    | 5  | 12 | 5  | 8   | 0    |    |
| 24 FT            | 17               | 18 | 11 | 8  | 6             | 7.5  | 6       | 8.5  | 50.8 | 37.0  | 37.0  | 37.0   | 6       | 6    | 14 | 48.0  | 55.0    | 6    | 6  | 14 | 33.0             | 36.0 | 6       | 6    | 6.5 | 5     | 6.5   | 42.0                                | 110     | 122  | 134 | 6   | 6         | 6.5  | 42.0    | 50.0 | 5  | 5  | 12 | 5   | 7.5  | 0  |
| 26 FT            | 18               | 19 | 11 | 8  | 6             | 7    | 6       | 8    | 50.4 | 38.0  | 38.0  | 38.0   | 6       | 6    | 13 | 47.0  | 55.0    | 6    | 6  | 13 | 33.0             | 35.0 | 6       | 6    | 6.5 | 5     | 6     | 41.8                                | 111     | 123  | 135 | 6   | 6         | 6    | 42.0    | 50.0 | 5  | 5  | 12 | 5   | 7.5  | 0  |
| 28 FT            | 18               | 20 | 12 | 8  | 6             | 7    | 6       | 8    | 51.0 | 38.0  | 38.0  | 38.0   | 6       | 6    | 13 | 47.0  | 54.0    | 6    | 6  | 13 | 34.0             | 36.0 | 6       | 6    | 6.5 | 5     | 6.5   | 41.9                                | 112     | 124  | 136 | 6   | 6         | 6    | 42.0    | 50.0 | 5  | 5  | 12 | 5   | 7.5  | 0  |
| 30 FT            | 19               | 21 | 12 | 8  | 6             | 6.5  | 6       | 7.5  | 50.9 | 39.0  | 39.0  | 39.0   | 6       | 6    | 13 | 47.0  | 54.0    | 6    | 6  | 13 | 33.0             | 35.0 | 6       | 6    | 6.5 | 5     | 6.5   | 41.9                                | 113     | 125  | 137 | 7   | 7         | 7.5  | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 7    | 0  |
| 32 FT            | 20               | 22 | 12 | 8  | 6             | 6.5  | 6       | 7    | 50.9 | 40.0  | 40.0  | 40.0   | 6       | 6    | 12 | 47.0  | 54.0    | 6    | 6  | 12 | 32.0             | 34.0 | 6       | 6    | 6   | 5     | 6.5   | 42.0                                | 114     | 126  | 138 | 7   | 7         | 7.5  | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 7    | 0  |
| 34 FT            | 21               | 23 | 12 | 8  | 6             | 6    | 6       | 7.5  | 49.6 | 41.0  | 41.0  | 41.0   | 6       | 6    | 12 | 46.0  | 53.0    | 6    | 6  | 12 | 31.0             | 33.0 | 6       | 6    | 6   | 5     | 6.5   | 40.8                                | 115     | 127  | 139 | 7   | 7         | 7.5  | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 7    | 0  |
| 36 FT            | 22               | 24 | 12 | 8  | 6             | 6    | 6       | 7    | 49.8 | 42.0  | 42.0  | 42.0   | 7       | 7    | 15 | 51.0  | 58.0    | 7    | 7  | 15 | 36.0             | 37.0 | 6       | 6    | 6   | 5     | 6.5   | 40.9                                | 116     | 128  | 140 | 7   | 7         | 7.5  | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 7    | 0  |
| 38 FT            | 22               | 24 | 13 | 8  | 6             | 6    | 6       | 7.5  | 50.4 | 42.0  | 42.0  | 42.0   | 7       | 7    | 15 | 51.0  | 58.0    | 7    | 7  | 15 | 36.0             | 38.0 | 6       | 6    | 6   | 5     | 6     | 41.1                                | 116     | 128  | 140 | 7   | 7         | 7    | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 6.5  | 0  |
| 40 FT            | 23               | 25 | 13 | 8  | 7             | 7.5  | 6       | 7.5  | 50.4 | 43.0  | 43.0  | 43.0   | 7       | 7    | 15 | 51.0  | 58.0    | 7    | 7  | 15 | 36.0             | 37.0 | 6       | 6    | 6   | 5     | 6     | 41.4                                | 117     | 129  | 141 | 7   | 7         | 7    | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 6.5  | 0  |
| 42 FT            | 24               | 26 | 13 | 8  | 7             | 7.5  | 6       | 6.5  | 50.5 | 44.0  | 44.0  | 44.0   | 7       | 7    | 15 | 51.0  | 57.0    | 7    | 7  | 15 | 35.0             | 36.0 | 7       | 8    | 5   | 6     | 41.5  | 118                                 | 130     | 142  | 7   | 7   | 7         | 45.0 | 53.0    | 5    | 5  | 12 | 5  | 6.5 | 0    |    |
| 44 FT            | 24               | 27 | 14 | 8  | 7             | 7.5  | 6       | 7    | 51.3 | 44.0  | 44.0  | 44.0   | 7       | 7    | 14 | 51.0  | 57.0    | 7    | 7  | 14 | 36.0             | 37.0 | 7       | 8    | 5   | 6     | 41.9  | 119                                 | 131     | 143  | 7   | 7   | 7         | 45.0 | 54.0    | 5    | 5  | 12 | 5  | 6   | 0    |    |
| 46 FT            | 25               | 27 | 14 | 8  | 7             | 7    | 6       | 7    | 51.3 | 45.0  | 45.0  | 45.0   | 7       | 7    | 14 | 51.0  | 57.0    | 7    | 7  | 14 | 35.0             | 36.0 | 7       | 7    | 7.5 | 5     | 6     | 42.0                                | 119     | 131  | 143 | 7   | 6.5       | 6.5  | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 6    | 0  |
| 48 FT            | 26               | 28 | 14 | 8  | 7             | 7    | 6       | 7    | 51.4 | 46.0  | 46.0  | 46.0   | 7       | 7    | 15 | 51.0  | 56.0    | 7    | 7  | 15 | 35.0             | 36.0 | 7       | 7    | 7.5 | 5     | 6     | 42.1                                | 120     | 132  | 144 | 7   | 6.5       | 6.5  | 45.0    | 53.0 | 5  | 5  | 12 | 5   | 6    | 0  |
| 50 FT            | 26               | 29 | 15 | 8  | 7             | 7    | 6       | 7    | 52.1 | 50.0  | 50.0  | 50.0   | 7       | 7    | 14 | 51.0  | 56.0    | 7    | 7  | 14 | 35.0             | 36.0 | 7       | 7    | 7.5 | 6     | 8     | 45.5                                | 121     | 133  | 145 | 7   | 6.5       | 6.5  | 45.0    | 54.0 | 5  | 5  | 12 | 6   | 8    | 0  |



| SPAN (S) = 10 FT |                  |    |    |    |               |      |         |      |      |        |         |        |      |      |         |      |      |      |         |      |                  |      |      |      |         |        |        |        |         |      |         |      | HEIGHT (HT) = 11 FT OR 12 FT OR 13 FT |      |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|--------|---------|--------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|--------|--------|--------|---------|------|---------|------|---------------------------------------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |         |        |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |        |        |        |         |      |         |      | WALL BARS                             |      |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |        | H1 BARS |        |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |        |        |        | B1 BARS |      | B2 BARS |      |                                       |      |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |         |        | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3     |        |        | SIZE    | SPA. | C7      | Q10  | SIZE                                  | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=11' | HT=12'  | HT=13' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=11' | HT=12' | HT=13' |         |      |         |      |                                       |      |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 13               | 10 | 9  | 10 | 5             | 6.5  | 5       | 6.5  | 55.9 | 33.0   | 33.0    | 33.0   | 5    | 16   | 101.5   | 75.5 | 5    | 16   | 30.0    | 29.0 | 5                | 8.5  | 6    | 6    | 82.3    | 138    | 150    | 162    | 5       | 6.5  | 49.0    | 49.0 | 5                                     | 10   | 5    | 8.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 13               | 10 | 10 | 10 | 5             | 6.5  | 5       | 6.5  | 56.5 | 33.0   | 33.0    | 33.0   | 5    | 14   | 101.5   | 75.5 | 5    | 14   | 29.0    | 29.0 | 5                | 8    | 6    | 6.5  | 83.0    | 138    | 150    | 162    | 5       | 6.5  | 47.0    | 48.0 | 5                                     | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 13               | 10 | 10 | 10 | 5             | 6.5  | 6       | 7    | 56.5 | 33.0   | 33.0    | 33.0   | 5    | 13   | 101.5   | 77.0 | 5    | 13   | 31.0    | 31.0 | 5                | 7    | 6    | 6    | 83.0    | 138    | 150    | 162    | 5       | 6    | 47.0    | 48.0 | 5                                     | 11   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 9                | 10 | 10 | 10 | 5             | 7    | 6       | 7    | 56.5 | 29.0   | 29.0    | 33.0   | 5    | 13   | 101.5   | 77.0 | 5    | 13   | 31.0    | 31.0 | 5                | 7    | 6    | 6    | 81.3    | 138    | 150    | 162    | 5       | 6    | 46.0    | 48.0 | 5                                     | 11   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 9                | 11 | 10 | 10 | 5             | 8    | 6       | 7    | 75.6 | 29.0   | 29.0    | 33.0   | 5    | 13   | 54.0    | 53.0 | 5    | 13   | 29.0    | 29.0 | 5                | 7    | 6    | 6    | 77.8    | 139    | 151    | 163    | 5       | 6    | 44.0    | 47.0 | 5                                     | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 9                | 11 | 11 | 10 | 5             | 8    | 6       | 7    | 64.6 | 29.0   | 29.0    | 33.0   | 5    | 12   | 47.0    | 48.0 | 5    | 12   | 28.0    | 28.0 | 5                | 6.5  | 6    | 6.5  | 69.5    | 139    | 151    | 163    | 6       | 7    | 45.0    | 49.0 | 5                                     | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 10               | 11 | 11 | 10 | 5             | 8    | 5       | 6    | 61.1 | 30.0   | 30.0    | 30.0   | 5    | 12   | 46.0    | 47.0 | 5    | 12   | 28.0    | 28.0 | 5                | 6    | 6    | 6    | 65.8    | 139    | 151    | 163    | 6       | 6.5  | 45.0    | 48.0 | 5                                     | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 11               | 12 | 11 | 10 | 5             | 7.5  | 5       | 6    | 60.3 | 31.0   | 31.0    | 31.0   | 5    | 12   | 44.0    | 47.0 | 5    | 12   | 27.0    | 28.0 | 5                | 6    | 6    | 6    | 65.1    | 140    | 152    | 164    | 6       | 6.5  | 44.0    | 49.0 | 5                                     | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 12               | 13 | 11 | 10 | 5             | 7    | 6       | 7.5  | 62.6 | 32.0   | 32.0    | 36.0   | 5    | 12   | 43.0    | 46.0 | 5    | 12   | 27.0    | 28.0 | 5                | 6    | 6    | 6.5  | 64.4    | 141    | 153    | 165    | 6       | 6.5  | 44.0    | 49.0 | 5                                     | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 13               | 14 | 12 | 10 | 5             | 6.5  | 6       | 8    | 61.3 | 33.0   | 33.0    | 37.0   | 5    | 12   | 42.0    | 46.0 | 5    | 12   | 27.0    | 28.0 | 6                | 8    | 6    | 7    | 63.0    | 142    | 154    | 166    | 6       | 7    | 44.0    | 49.0 | 5                                     | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 13               | 15 | 12 | 10 | 5             | 6.5  | 6       | 7    | 59.3 | 33.0   | 37.0    | 37.0   | 6    | 15   | 45.0    | 48.0 | 6    | 15   | 30.0    | 31.0 | 6                | 7.5  | 6    | 6.5  | 62.8    | 143    | 155    | 167    | 6       | 7    | 44.0    | 49.0 | 5                                     | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 14               | 16 | 13 | 10 | 5             | 6    | 6       | 7.5  | 58.8 | 34.0   | 38.0    | 38.0   | 6    | 15   | 44.0    | 48.0 | 6    | 15   | 30.0    | 31.0 | 6                | 7    | 6    | 7    | 61.8    | 144    | 156    | 168    | 6       | 7    | 44.0    | 49.0 | 5                                     | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 15               | 17 | 13 | 10 | 6             | 8    | 6       | 6.5  | 64.6 | 35.0   | 39.0    | 39.0   | 6    | 15   | 50.0    | 54.0 | 6    | 15   | 36.0    | 37.0 | 6                | 7    | 6    | 6.5  | 61.4    | 145    | 157    | 169    | 6       | 6.5  | 44.0    | 50.0 | 5                                     | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 16               | 18 | 14 | 10 | 6             | 8    | 6       | 7    | 64.6 | 36.0   | 40.0    | 40.0   | 6    | 15   | 49.0    | 54.0 | 6    | 15   | 35.0    | 37.0 | 6                | 6.5  | 6    | 6.5  | 60.5    | 146    | 158    | 170    | 6       | 6.5  | 44.0    | 50.0 | 5                                     | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 17               | 19 | 14 | 10 | 6             | 7.5  | 6       | 6.5  | 64.5 | 37.0   | 41.0    | 41.0   | 6    | 14   | 49.0    | 54.0 | 6    | 14   | 35.0    | 37.0 | 6                | 6.5  | 6    | 6.5  | 60.4    | 147    | 159    | 171    | 6       | 6    | 44.0    | 50.0 | 5                                     | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 18               | 20 | 15 | 10 | 6             | 7    | 6       | 6.5  | 64.9 | 42.0   | 42.0    | 42.0   | 6    | 13   | 48.0    | 54.0 | 6    | 13   | 34.0    | 36.0 | 6                | 6.5  | 6    | 6.5  | 60.3    | 148    | 160    | 172    | 6       | 6    | 44.0    | 50.0 | 5                                     | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 19               | 21 | 15 | 10 | 6             | 6.5  | 6       | 6.5  | 65.1 | 43.0   | 43.0    | 43.0   | 6    | 13   | 48.0    | 54.0 | 6    | 13   | 33.0    | 35.0 | 6                | 6.5  | 6    | 6.5  | 60.4    | 149    | 161    | 173    | 7       | 7.5  | 47.0    | 53.0 | 5                                     | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 20               | 22 | 16 | 10 | 6             | 6.5  | 6       | 6.5  | 65.5 | 44.0   | 44.0    | 44.0   | 6    | 12   | 48.0    | 53.0 | 6    | 12   | 33.0    | 34.0 | 6                | 6    | 6    | 7    | 60.5    | 150    | 162    | 174    | 7       | 7.5  | 47.0    | 53.0 | 5                                     | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 20               | 23 | 16 | 10 | 6             | 6.5  | 6       | 6.5  | 63.5 | 44.0   | 44.0    | 44.0   | 6    | 12   | 47.0    | 53.0 | 6    | 12   | 33.0    | 35.0 | 6                | 6    | 6    | 7.5  | 58.9    | 151    | 163    | 175    | 7       | 7.5  | 46.0    | 53.0 | 5                                     | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 21               | 24 | 16 | 10 | 6             | 6    | 6       | 6    | 63.9 | 45.0   | 45.0    | 45.0   | 6    | 12   | 47.0    | 53.0 | 6    | 12   | 32.0    | 34.0 | 6                | 6    | 6    | 7    | 59.1    | 152    | 164    | 176    | 7       | 7.5  | 46.0    | 53.0 | 5                                     | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 22               | 24 | 17 | 10 | 6             | 6    | 6       | 6    | 64.4 | 46.0   | 46.0    | 46.0   | 7    | 15   | 52.0    | 58.0 | 7    | 15   | 37.0    | 38.0 | 6                | 6    | 6    | 7    | 59.0    | 152    | 164    | 176    | 7       | 7    | 46.0    | 53.0 | 5                                     | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 23               | 25 | 17 | 10 | 6             | 6    | 6       | 6    | 64.6 | 47.0   | 47.0    | 47.0   | 7    | 15   | 52.0    | 57.0 | 7    | 15   | 36.0    | 37.0 | 6                | 6    | 6    | 7    | 59.3    | 153    | 165    | 177    | 7       | 7    | 46.0    | 53.0 | 5                                     | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 23               | 26 | 18 | 10 | 7             | 7.5  | 6       | 6    | 65.0 | 47.0   | 47.0    | 47.0   | 7    | 15   | 52.0    | 57.0 | 7    | 15   | 37.0    | 38.0 | 7                | 8    | 6    | 6.5  | 59.6    | 154    | 166    | 178    | 7       | 7    | 46.0    | 54.0 | 5                                     | 12   | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 24               | 27 | 19 | 10 | 7             | 7.5  | 6       | 6    | 65.8 | 44.0   | 48.0    | 48.0   | 7    | 15   | 52.0    | 57.0 | 7    | 15   | 36.0    | 37.0 | 7                | 8    | 6    | 6.5  | 60.0    | 155    | 167    | 179    | 7       | 7    | 46.0    | 54.0 | 5                                     | 12   | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 24               | 27 | 19 | 10 | 7             | 7    | 6       | 6    | 65.6 | 48.0   | 48.0    | 48.0   | 7    | 14   | 52.0    | 57.0 | 7    | 14   | 36.0    | 38.0 | 7                | 7.5  | 6    | 6.5  | 59.9    | 155    | 167    | 179    | 7       | 6.5  | 46.0    | 54.0 | 5                                     | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 25               | 28 | 20 | 10 | 7             | 7    | 6       | 6    | 66.4 | 45.0   | 49.0    | 49.0   | 7    | 14   | 52.0    | 56.0 | 7    | 14   | 36.0    | 37.0 | 7                | 7.5  | 6    | 6    | 60.4    | 156    | 168    | 180    | 7       | 6.5  | 46.0    | 54.0 | 5                                     | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 26               | 29 | 20 | 10 | 7             | 7    | 7       | 7.5  | 71.6 | 50.0   | 50.0    | 50.0   | 7    | 15   | 51.0    | 55.0 | 7    | 15   | 36.0    | 37.0 | 7                | 7.5  | 6    | 6    | 60.6    | 157    | 169    | 181    | 7       | 6.5  | 47.0    | 54.0 | 5                                     | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

BRYAN A. HARTNAGEL

NUMBER PE-2002024473

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE TRIPLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 10 FEET  
HEIGHT (HT): 11 THRU 13 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.87A

SHEET NO.  
15 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

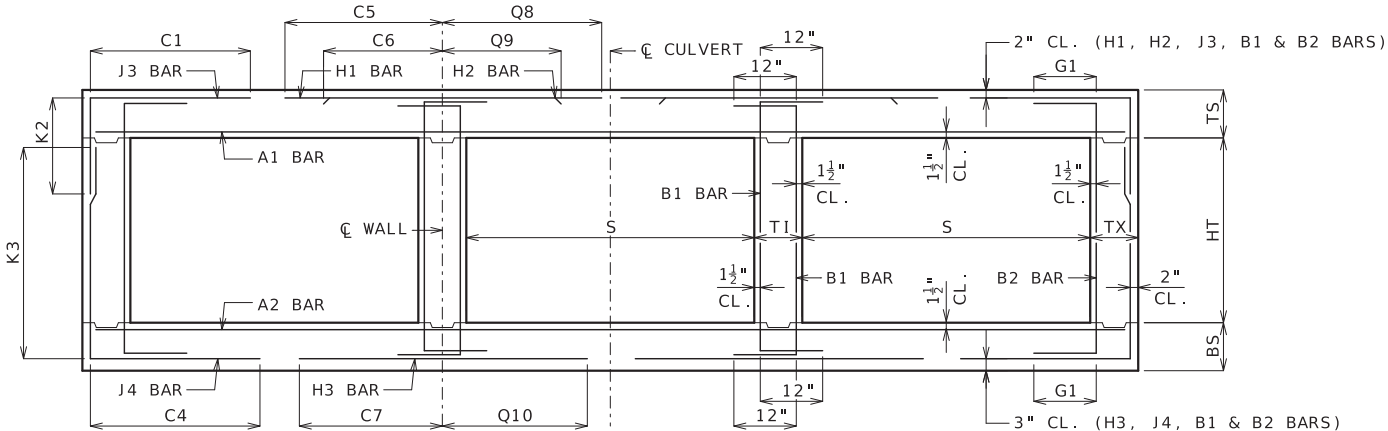


| SPAN (S) = 11 FT |                     |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         |      | HEIGHT (HT) = 6 FT OR 7 FT OR 8 FT |      |           |      |      |      |    |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------|------------------------------------|------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |      |                                    |      | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |      | B2 BARS                            |      |           |      |      |      |    |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA. | C7                                 | Q10  | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=6' | HT=7'   | HT=8' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=6' | HT=7' | HT=8' |         |      |                                    |      |           |      |      |      |    |  |  |  |  |  |  |  |  |
| 1 FT             | 13                  | 9  | 8  | 8  | 5             | 6.5  | 5       | 9    | 58.5 | 29.0  | 29.0    | 33.0  | 5    | 13   | 108.5   | 80.5 | 5    | 13   | 30.0    | 33.0 | 5                | 8.5  | 5    | 6    | 52.6    | 77    | 89    | 101   | 6       | 7    | 50.0                               | 53.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 2 FT             | 14                  | 9  | 8  | 8  | 5             | 6    | 4       | 6    | 55.5 | 30.0  | 30.0    | 30.0  | 5    | 14   | 106.5   | 80.5 | 5    | 14   | 29.0    | 28.0 | 5                | 7.5  | 6    | 6.5  | 50.8    | 77    | 89    | 101   | 6       | 6.5  | 49.0                               | 52.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 2'- 4'           | 14                  | 9  | 8  | 8  | 5             | 6    | 5       | 6    | 55.5 | 30.0  | 30.0    | 30.0  | 5    | 12   | 106.5   | 82.0 | 5    | 12   | 32.0    | 33.0 | 5                | 7.5  | 6    | 6.5  | 50.8    | 77    | 89    | 101   | 6       | 6    | 49.0                               | 52.0 | 5         | 11.5 | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 4 FT             | 10                  | 9  | 8  | 8  | 5             | 6.5  | 5       | 6    | 49.1 | 30.0  | 30.0    | 30.0  | 5    | 12   | 66.0    | 82.0 | 5    | 12   | 32.0    | 33.0 | 5                | 7.5  | 6    | 6.5  | 45.9    | 77    | 89    | 101   | 6       | 6    | 49.0                               | 52.0 | 5         | 11.5 | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 6 FT             | 10                  | 10 | 8  | 8  | 5             | 7    | 5       | 6    | 42.8 | 30.0  | 30.0    | 30.0  | 5    | 12   | 53.0    | 63.0 | 5    | 12   | 30.0    | 31.0 | 5                | 7    | 5    | 6    | 39.8    | 78    | 90    | 102   | 6       | 6    | 47.0                               | 52.0 | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |
| 8 FT             | 10                  | 11 | 8  | 8  | 5             | 7    | 6       | 7    | 43.0 | 26.0  | 30.0    | 30.0  | 6    | 15   | 52.0    | 56.0 | 6    | 15   | 32.0    | 32.0 | 5                | 6.5  | 5    | 6.5  | 37.4    | 79    | 91    | 103   | 6       | 6.5  | 46.0                               | 52.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 10 FT            | 11                  | 12 | 8  | 8  | 5             | 7    | 5       | 6    | 37.6 | 27.0  | 31.0    | 31.0  | 6    | 15   | 50.0    | 55.0 | 6    | 15   | 31.0    | 32.0 | 5                | 6    | 5    | 7    | 35.6    | 80    | 92    | 104   | 6       | 6.5  | 45.0                               | 52.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 12 FT            | 12                  | 13 | 8  | 8  | 5             | 7    | 5       | 6.5  | 36.0 | 28.0  | 32.0    | 32.0  | 6    | 15   | 48.0    | 54.0 | 6    | 15   | 31.0    | 32.0 | 5                | 6    | 5    | 7.5  | 34.6    | 81    | 93    | 105   | 6       | 6.5  | 45.0                               | 52.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 14 FT            | 13                  | 14 | 8  | 8  | 5             | 6.5  | 5       | 7    | 34.6 | 33.0  | 33.0    | 33.0  | 6    | 15   | 47.0    | 54.0 | 6    | 15   | 31.0    | 32.0 | 6                | 8    | 5    | 7.5  | 33.8    | 82    | 94    | 106   | 6       | 6.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 16 FT            | 14                  | 15 | 8  | 8  | 5             | 6    | 5       | 7    | 33.6 | 34.0  | 34.0    | 34.0  | 6    | 14   | 46.0    | 53.0 | 6    | 14   | 30.0    | 32.0 | 6                | 7.5  | 5    | 7.5  | 33.1    | 83    | 95    | 107   | 6       | 6.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |
| 18 FT            | 15                  | 16 | 8  | 8  | 6             | 8    | 5       | 6.5  | 37.9 | 35.0  | 35.0    | 35.0  | 6    | 14   | 51.0    | 59.0 | 6    | 14   | 36.0    | 38.0 | 6                | 7    | 5    | 7.5  | 32.6    | 84    | 96    | 108   | 6       | 6.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 11   | 0  |  |  |  |  |  |  |  |  |
| 20 FT            | 16                  | 17 | 8  | 8  | 6             | 8    | 5       | 6.5  | 37.3 | 36.0  | 36.0    | 36.0  | 6    | 14   | 51.0    | 59.0 | 6    | 14   | 36.0    | 38.0 | 6                | 7    | 5    | 7    | 32.1    | 85    | 97    | 109   | 6       | 6.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 10   | 0  |  |  |  |  |  |  |  |  |
| 22 FT            | 17                  | 18 | 8  | 8  | 6             | 7.5  | 5       | 6    | 36.9 | 37.0  | 37.0    | 37.0  | 6    | 14   | 50.0    | 59.0 | 6    | 14   | 36.0    | 38.0 | 6                | 6.5  | 5    | 6.5  | 31.9    | 86    | 98    | 110   | 6       | 6.5  | 44.0                               | 53.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 24 FT            | 18                  | 19 | 8  | 8  | 6             | 7    | 5       | 6    | 36.5 | 38.0  | 38.0    | 38.0  | 6    | 13   | 50.0    | 59.0 | 6    | 13   | 36.0    | 38.0 | 6                | 6    | 5    | 6.5  | 31.6    | 87    | 99    | 111   | 6       | 6    | 44.0                               | 53.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 26 FT            | 19                  | 21 | 8  | 8  | 6             | 6.5  | 6       | 7.5  | 40.4 | 39.0  | 39.0    | 43.0  | 6    | 13   | 50.0    | 59.0 | 6    | 13   | 35.0    | 38.0 | 6                | 6    | 6    | 7.5  | 34.4    | 89    | 101   | 113   | 7       | 7.5  | 47.0                               | 56.0 | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |
| 28 FT            | 20                  | 22 | 9  | 8  | 6             | 6.5  | 5       | 6    | 37.1 | 40.0  | 40.0    | 40.0  | 6    | 12   | 49.0    | 58.0 | 6    | 12   | 35.0    | 37.0 | 6                | 6    | 5    | 6    | 31.9    | 90    | 102   | 114   | 7       | 7.5  | 47.0                               | 56.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |
| 30 FT            | 21                  | 23 | 10 | 8  | 6             | 6    | 5       | 6.5  | 37.9 | 41.0  | 41.0    | 41.0  | 6    | 12   | 49.0    | 58.0 | 6    | 12   | 34.0    | 37.0 | 7                | 8    | 5    | 6.5  | 32.4    | 91    | 103   | 115   | 7       | 7    | 47.0                               | 56.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |
| 32 FT            | 22                  | 24 | 10 | 8  | 6             | 6    | 5       | 6.5  | 37.8 | 42.0  | 42.0    | 42.0  | 7    | 15   | 54.0    | 63.0 | 7    | 15   | 39.0    | 41.0 | 7                | 7.5  | 5    | 6.5  | 32.5    | 92    | 104   | 116   | 7       | 7    | 47.0                               | 57.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 34 FT            | 23                  | 25 | 10 | 8  | 7             | 7.5  | 5       | 6.5  | 37.8 | 43.0  | 43.0    | 43.0  | 7    | 15   | 54.0    | 63.0 | 7    | 15   | 38.0    | 40.0 | 7                | 7.5  | 5    | 6    | 32.5    | 93    | 105   | 117   | 7       | 6.5  | 47.0                               | 57.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 36 FT            | 24                  | 25 | 10 | 8  | 7             | 7.5  | 5       | 6    | 36.5 | 44.0  | 44.0    | 44.0  | 7    | 14   | 54.0    | 62.0 | 7    | 14   | 37.0    | 39.0 | 7                | 7    | 5    | 6    | 31.6    | 93    | 105   | 117   | 7       | 6.5  | 47.0                               | 56.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 38 FT            | 25                  | 26 | 10 | 8  | 7             | 7    | 5       | 6    | 36.6 | 45.0  | 45.0    | 45.0  | 7    | 14   | 53.0    | 62.0 | 7    | 14   | 37.0    | 38.0 | 7                | 7    | 5    | 6    | 31.8    | 94    | 106   | 118   | 7       | 6.5  | 47.0                               | 56.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 40 FT            | 25                  | 27 | 10 | 8  | 7             | 6.5  | 5       | 6    | 36.8 | 45.0  | 45.0    | 45.0  | 7    | 13   | 53.0    | 62.0 | 7    | 13   | 37.0    | 39.0 | 7                | 7    | 6    | 7    | 34.6    | 95    | 107   | 119   | 7       | 6.5  | 46.0                               | 56.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 42 FT            | 26                  | 28 | 10 | 8  | 7             | 7    | 6       | 7    | 40.8 | 50.0  | 50.0    | 50.0  | 7    | 13   | 53.0    | 62.0 | 7    | 13   | 37.0    | 38.0 | 7                | 7    | 6    | 7    | 34.9    | 96    | 108   | 120   | 7       | 6.5  | 46.0                               | 56.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 44 FT            | 27                  | 29 | 10 | 8  | 7             | 6.5  | 6       | 7    | 40.9 | 51.0  | 51.0    | 51.0  | 7    | 13   | 53.0    | 61.0 | 7    | 13   | 36.0    | 37.0 | 7                | 7    | 6    | 6.5  | 35.0    | 97    | 109   | 121   | 7       | 6.5  | 46.0                               | 56.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 46 FT            | 28                  | 29 | 11 | 8  | 7             | 6.5  | 6       | 7.5  | 41.6 | 52.0  | 52.0    | 52.0  | 7    | 13   | 53.0    | 61.0 | 7    | 13   | 36.0    | 37.0 | 7                | 6    | 6    | 7.5  | 35.6    | 97    | 109   | 121   | 7       | 6    | 47.0                               | 57.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 48 FT            | 28                  | 30 | 11 | 8  | 7             | 6    | 6       | 7.5  | 41.8 | 52.0  | 52.0    | 52.0  | 7    | 12   | 53.0    | 61.0 | 7    | 12   | 36.0    | 37.0 | 7                | 6.5  | 6    | 7    | 35.6    | 98    | 110   | 122   | 7       | 6    | 47.0                               | 57.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 50 FT            | 29                  | 31 | 11 | 8  | 7             | 6    | 6       | 7    | 41.9 | 53.0  | 53.0    | 53.0  | 7    | 12   | 53.0    | 60.0 | 7    | 12   | 36.0    | 37.0 | 7                | 6.5  | 6    | 7    | 35.9    | 99    | 111   | 123   | 7       | 6    | 47.0                               | 57.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |

| SPAN (S) = 11 FT |                  |    |    |    |               |      |         |      |      |       |         |        |      |      |         |      |      |      |         |      |                  |      |      |      |         |     |       |        |        | HEIGHT (HT) = 9 FT OR 10 FT OR 11 FT |      |      |           |      |      |      |    |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|--------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-----|-------|--------|--------|--------------------------------------|------|------|-----------|------|------|------|----|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |        |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |     |       |        |        |                                      |      |      | WALL BARS |      |      |      |    |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |        |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |     |       |        |        |                                      |      |      |           |      |      |      |    |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |        | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3  |       |        | SIZE   | SPA.                                 | C7   | Q10  | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=9' | HT=10'  | HT=11' |      |      |         |      |      |      |         |      |                  |      |      |      |         |     | HT=9' | HT=10' | HT=11' |                                      |      |      |           |      |      |      |    |  |  |  |  |
| 1 FT             | 13               | 9  | 9  | 9  | 5             | 6.5  | 5       | 8    | 59.3 | 33.0  | 33.0    | 33.0   | 5    | 13   | 109.5   | 81.5 | 5    | 13   | 31.0    | 33.0 | 5                | 7.5  | 6    | 6    | 74.5    | 113 | 125   | 137    | 6      | 7                                    | 51.0 | 53.0 | 5         | 11.5 | 5    | 10.5 | 12 |  |  |  |  |
| 2 FT             | 14               | 10 | 9  | 9  | 5             | 6    | 5       | 8    | 59.3 | 34.0  | 34.0    | 34.0   | 5    | 14   | 109.5   | 81.5 | 5    | 14   | 29.0    | 28.0 | 5                | 7.5  | 6    | 7    | 70.6    | 114 | 126   | 138    | 5      | 6                                    | 47.0 | 50.0 | 5         | 12   | 5    | 10.5 | 12 |  |  |  |  |
| 2'- 4'           | 14               | 10 | 9  | 9  | 5             | 6    | 5       | 6    | 59.3 | 34.0  | 34.0    | 34.0   | 5    | 13   | 109.5   | 83.0 | 5    | 13   | 32.0    | 33.0 | 5                | 7    | 6    | 6.5  | 70.6    | 114 | 126   | 138    | 6      | 6.5                                  | 50.0 | 53.0 | 5         | 11.5 | 5    | 9.5  | 12 |  |  |  |  |
| 4 FT             | 10               | 10 | 9  | 9  | 5             | 6.5  | 5       | 6    | 59.3 | 30.0  | 30.0    | 30.0   | 5    | 13   | 109.5   | 83.0 | 5    | 13   | 32.0    | 33.0 | 5                | 7    | 6    | 6.5  | 64.1    | 114 | 126   | 138    | 6      | 6.5                                  | 50.0 | 53.0 | 5         | 11.5 | 5    | 9.5  | 12 |  |  |  |  |
| 6 FT             | 10               | 10 | 9  | 9  | 5             | 7    | 5       | 6    | 56.6 | 30.0  | 30.0    | 30.0   | 5    | 12   | 55.0    | 61.0 | 5    | 12   | 30.0    | 31.0 | 5                | 7    | 6    | 6    | 57.8    | 114 | 126   | 138    | 6      | 6                                    | 48.0 | 52.0 | 5         | 12   | 5    | 9.5  | 12 |  |  |  |  |
| 8 FT             | 10               | 11 | 9  | 9  | 5             | 7    | 6       | 7.5  | 55.5 | 30.0  | 30.0    | 34.0   | 6    | 15   | 53.0    | 56.0 | 6    | 15   | 32.0    | 33.0 | 5                | 6.5  | 6    | 6    | 55.6    | 115 | 127   | 139    | 6      | 6                                    | 47.0 | 52.0 | 5         | 12   | 5    | 9    | 0  |  |  |  |  |
| 10 FT            | 11               | 12 | 9  | 9  | 5             | 7    | 6       | 7    | 53.5 | 31.0  | 35.0    | 35.0   | 6    | 15   | 51.0    | 55.0 | 6    | 15   | 32.0    | 33.0 | 5                | 6    | 6    | 6    | 53.8    | 116 | 128   | 140    | 6      | 6.5                                  | 46.0 | 52.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |
| 12 FT            | 12               | 13 | 9  | 9  | 5             | 7    | 6       | 6.5  | 51.9 | 32.0  | 36.0    | 36.0   | 6    | 15   | 49.0    | 54.0 | 6    | 15   | 31.0    | 33.0 | 5                | 6    | 6    | 6    | 52.4    | 117 | 129   | 141    | 6      | 6.5                                  | 46.0 | 52.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |
| 14 FT            | 13               | 14 | 9  | 9  | 5             | 6.5  | 6       | 6    | 50.5 | 33.0  | 37.0    | 37.0   | 6    | 15   | 48.0    | 53.0 | 6    | 15   | 31.0    | 33.0 | 6                | 8    | 6    | 6    | 51.3    | 118 | 130   | 142    | 6      | 6.5                                  | 45.0 | 52.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |
| 16 FT            | 14               | 15 | 10 | 9  | 5             | 6    | 6       | 7    | 49.9 | 34.0  | 34.0    | 38.0   | 6    | 15   | 47.0    | 53.0 | 6    | 15   | 31.0    | 33.0 | 6                | 7.5  | 6    | 7    | 50.4    | 119 | 131   | 143    | 6      | 6.5                                  | 45.0 | 52.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |
| 18 FT            | 15               | 16 | 10 | 9  | 6             | 8    | 6       | 7    | 54.9 | 35.0  | 35.0    | 39.0   | 6    | 15   | 52.0    | 59.0 | 6    | 15   | 37.0    | 39.0 | 6                | 7    | 6    | 7    | 49.6    | 120 | 132   | 144    | 6      | 6.5                                  | 45.0 | 53.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |
| 20 FT            | 16               | 17 | 11 | 9  | 6             | 8    | 6       | 7.5  | 54.8 | 36.0  | 36.0    | 40.0   | 6    | 14   | 52.0    | 58.0 | 6    | 14   | 36.0    | 39.0 | 6                | 7    | 6    | 8    | 49.3    | 121 | 133   | 145    | 6      | 6.5                                  | 45.0 | 53.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |
| 22 FT            | 17               | 18 | 12 | 9  | 6             | 7.5  | 6       | 8    | 54.8 | 37.0  | 37.0    | 37.0   | 6    | 14   | 51.0    | 58.0 | 6    | 14   | 36.0    | 39.0 | 6                | 6.5  | 5    | 6    | 45.9    | 122 | 134   | 146    | 6      | 6.5                                  | 45.0 | 53.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |
| 24 FT            | 18               | 20 | 12 | 9  | 6             | 7    | 6       | 7.5  | 54.4 | 38.0  | 38.0    | 38.0   | 6    | 13   | 51.0    | 58.0 | 6    | 13   | 36.0    | 38.0 | 6                | 6    | 5    | 6    | 45.8    | 124 | 136   | 148    | 6      | 6                                    | 45.0 | 53.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |
| 26 FT            | 19               | 21 | 12 | 9  | 6             | 6.5  | 6       | 7    | 53.9 | 39.0  | 39.0    | 43.0   | 6    | 13   | 50.0    | 58.0 | 6    | 13   | 35.0    | 38.0 | 6                | 6    | 6    | 8.5  | 48.4    | 125 | 137   | 149    | 7      | 7.5                                  | 48.0 | 56.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |
| 28 FT            | 20               | 22 | 13 | 9  | 6             | 6.5  | 6       | 7.5  | 54.3 | 40.0  | 40.0    | 40.0   | 6    | 12   | 50.0    | 58.0 | 6    | 12   | 35.0    | 37.0 | 6                | 6    | 5    | 6    | 45.4    | 126 | 138   | 150    | 7      | 7.5                                  | 48.0 | 57.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |
| 30 FT            | 21               | 23 | 13 | 9  | 6             | 6    | 6       | 7    | 54.1 | 41.0  | 41.0    | 41.0   | 6    | 12   | 50.0    | 57.0 | 6    | 12   | 34.0    | 36.0 | 7                | 8    | 5    | 6    | 45.4    | 127 | 139   | 151    | 7      | 7                                    | 48.0 | 57.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |
| 32 FT            | 22               | 24 | 13 | 9  | 6             | 6    | 6       | 6.5  | 54.1 | 42.0  | 42.0    | 46.0   | 7    | 15   | 54.0    | 62.0 | 7    | 15   | 39.0    | 41.0 | 7                | 7.5  | 6    | 8    | 48.4    | 128 | 140   | 152    | 7      | 7                                    | 48.0 | 57.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |
| 34 FT            | 23               | 25 | 14 | 9  | 7             | 7.5  | 6       | 7    | 54.8 | 43.0  | 43.0    | 43.0   | 7    | 15   | 54.0    | 62.0 | 7    | 15   | 38.0    | 40.0 | 7                | 7.5  | 5    | 6    | 45.8    | 129 | 141   | 153    | 7      | 6.5                                  | 48.0 | 57.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |
| 36 FT            | 23               | 25 | 14 | 9  | 7             | 7    | 6       | 7    | 53.3 | 43.0  | 43.0    | 43.0   | 7    | 14   | 54.0    | 62.0 | 7    | 14   | 38.0    | 40.0 | 7                | 7    | 5    | 6    | 44.1    | 129 | 141   | 153    | 7      | 6.5                                  | 48.0 | 57.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |
| 38 FT            | 24               | 26 | 14 | 9  | 7             | 7.5  | 6       | 7    | 53.4 | 44.0  | 44.0    | 44.0   | 7    | 14   | 54.0    | 61.0 | 7    | 14   | 38.0    | 40.0 | 7                | 7    | 5    | 6    | 44.3    | 130 | 142   | 154    | 7      | 6.5                                  | 48.0 | 57.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |
| 40 FT            | 25               | 27 | 14 | 9  | 7             | 7    | 6       | 6.5  | 53.4 | 45.0  | 45.0    | 45.0   | 7    | 14   | 54.0    | 61.0 | 7    | 14   | 37.0    | 39.0 | 7                | 7    | 5    | 6    | 44.5    | 131 | 143   | 155    | 7      | 6.5                                  | 48.0 | 57.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |
| 42 FT            | 26               | 28 | 15 | 9  | 7             | 7    | 6       | 7    | 54.3 | 46.0  | 50.0    | 50.0   | 7    | 13   | 54.0    | 60.0 | 7    | 13   | 37.0    | 38.0 | 7                | 7    | 6    | 8    | 48.0    | 132 | 144   | 156    | 7      | 6                                    | 48.0 | 57.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |
| 44 FT            | 27               | 29 | 15 | 9  | 7             | 6.5  | 6       | 6.5  | 54.3 | 51.0  | 51.0    | 51.0   | 7    | 13   | 53.0    | 60.0 | 7    | 13   | 36.0    | 38.0 | 7                | 7    | 6    | 8    | 48.1    | 133 | 145   | 157    | 7      | 6                                    | 48.0 | 57.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |
| 46 FT            | 27               | 30 | 15 | 9  | 7             | 6.5  | 6       | 6    | 54.4 | 51.0  | 51.0    | 51.0   | 7    | 13   | 53.0    | 60.0 | 7    | 13   | 37.0    | 38.0 | 7                | 7    | 6    | 8    | 48.1    | 134 | 146   | 158    | 7      | 6                                    | 48.0 | 57.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |
| 48 FT            | 28               | 30 | 16 | 9  | 7             | 6.5  | 6       | 6.5  | 55.0 | 52.0  | 52.0    | 52.0   | 7    | 13   | 53.0    | 59.0 | 7    | 13   | 36.0    | 37.0 | 7                | 6    | 6    | 7.5  | 48.5    | 134 | 146   | 158    | 7      | 6                                    | 48.0 | 57.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |
| 50 FT            | 29               | 31 | 16 | 9  | 7             | 6.5  | 6       | 6.5  | 55.1 | 53.0  | 53.0    | 53.0   | 7    | 13   | 53.0    | 59.0 | 7    | 13   | 36.0    | 37.0 | 7                | 6.5  | 6    | 7.5  | 48.8    | 135 | 147   | 159    | 7      | 6                                    | 48.0 | 57.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |

| SPAN (S) = 11 FT                      |                     |    |    |    |               |      |      |      |         |        |        |        |         |      |       |      |         |      |      |      |                  |      |      |      |         |        |        |     |   |
|---------------------------------------|---------------------|----|----|----|---------------|------|------|------|---------|--------|--------|--------|---------|------|-------|------|---------|------|------|------|------------------|------|------|------|---------|--------|--------|-----|---|
| HEIGHT (HT) = 12 FT OR 13 FT OR 14 FT |                     |    |    |    |               |      |      |      |         |        |        |        |         |      |       |      |         |      |      |      |                  |      |      |      |         |        |        |     |   |
| DESIGN<br>FILL                        | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |      |      |         |        |        |        |         |      |       |      |         |      |      |      | BOTTOM SLAB BARS |      |      |      |         |        |        |     |   |
|                                       |                     |    |    |    | A1 BARS       |      |      |      | J3 BARS |        |        |        | H1 BARS |      |       |      | H2 BARS |      |      |      | A2 BARS          |      |      |      | J4 BARS |        |        |     |   |
|                                       |                     |    |    |    | SIZE          | SPA. | SIZE | SPA. | C1      | K2     |        |        | SIZE    | SPA. | C5    | Q8   | SIZE    | SPA. | C6   | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3     |        |     |   |
|                                       | TS                  | BS | TX | T1 |               |      |      |      |         | HT=12' | HT=13' | HT=14' |         |      |       |      |         |      |      |      |                  |      |      |      | HT=12'  | HT=13' | HT=14' |     |   |
| 1 FT                                  | 13                  | 10 | 10 | 11 | 5             | 6.5  | 5    | 6    | 60.3    | 33.0   | 33.0   | 33.0   | 5       | 13   | 110.5 | 82.5 | 5       | 13   | 31.0 | 33.0 | 5                | 7.5  | 6    | 6    | 89.3    | 150    | 162    | 174 | 5 |
| 2 FT                                  | 14                  | 11 | 10 | 11 | 5             | 6    | 5    | 6    | 60.3    | 34.0   | 34.0   | 34.0   | 5       | 14   | 110.5 | 82.5 | 5       | 14   | 30.0 | 32.0 | 5                | 7.5  | 6    | 6    | 89.3    | 151    | 163    | 175 | 5 |
| 2'- 4'                                | 14                  | 11 | 11 | 11 | 5             | 6    | 5    | 6    | 60.9    | 34.0   | 34.0   | 34.0   | 5       | 13   | 110.5 | 82.5 | 5       | 13   | 33.0 | 33.0 | 5                | 7    | 6    | 6    | 89.3    | 151    | 163    | 175 | 5 |
| 4 FT                                  | 10                  | 11 | 11 | 11 | 5             | 7    | 5    | 6    | 60.9    | 30.0   | 30.0   | 30.0   | 5       | 13   | 110.5 | 80.0 | 5       | 13   | 33.0 | 33.0 | 5                | 7    | 6    | 6.5  | 85.9    | 151    | 163    | 175 | 5 |
| 6 FT                                  | 10                  | 11 | 11 | 11 | 5             | 7.5  | 5    | 6    | 79.0    | 30.0   | 30.0   | 30.0   | 5       | 12   | 58.0  | 57.0 | 5       | 12   | 31.0 | 31.0 | 5                | 6.5  | 6    | 6    | 77.5    | 151    | 163    | 175 | 6 |
| 8 FT                                  | 10                  | 11 | 12 | 11 | 5             | 7.5  | 6    | 7.5  | 70.1    | 30.0   | 30.0   | 34.0   | 6       | 15   | 54.0  | 55.0 | 6       | 15   | 33.0 | 33.0 | 5                | 6.5  | 6    | 6    | 70.9    | 151    | 163    | 175 | 6 |
| 10 FT                                 | 11                  | 12 | 12 | 11 | 5             | 7.5  | 6    | 8    | 68.5    | 31.0   | 31.0   | 35.0   | 6       | 16   | 52.0  | 54.0 | 6       | 16   | 32.0 | 33.0 | 5                | 6    | 6    | 6    | 69.9    | 152    | 164    | 176 | 6 |
| 12 FT                                 | 12                  | 13 | 12 | 11 | 5             | 7    | 6    | 8    | 67.4    | 32.0   | 32.0   | 36.0   | 6       | 16   | 50.0  | 53.0 | 6       | 16   | 32.0 | 33.0 | 5                | 6    | 6    | 6.5  | 69.0    | 153    | 165    | 177 | 6 |
| 14 FT                                 | 13                  | 14 | 12 | 11 | 5             | 6.5  | 6    | 7    | 66.4    | 33.0   | 37.0   | 37.0   | 6       | 16   | 49.0  | 53.0 | 6       | 16   | 32.0 | 33.0 | 6                | 8    | 6    | 6.5  | 68.3    | 154    | 166    | 178 | 6 |
| 16 FT                                 | 14                  | 15 | 13 | 11 | 5             | 6    | 6    | 7    | 64.9    | 34.0   | 38.0   | 38.0   | 6       | 15   | 48.0  | 52.0 | 6       | 15   | 32.0 | 33.0 | 6                | 7.5  | 6    | 7    | 66.6    | 155    | 167    | 179 | 6 |
| 18 FT                                 | 15                  | 16 | 13 | 11 | 6             | 8    | 6    | 6.5  | 70.3    | 39.0   | 39.0   | 39.0   | 6       | 15   | 54.0  | 58.0 | 6       | 15   | 37.0 | 39.0 | 6                | 7    | 6    | 6    | 66.0    | 156    | 168    | 180 | 6 |
| 20 FT                                 | 15                  | 17 | 14 | 11 | 6             | 8    | 6    | 6.5  | 68.4    | 39.0   | 39.0   | 39.0   | 6       | 14   | 53.0  | 58.0 | 6       | 14   | 37.0 | 39.0 | 6                | 7    | 6    | 6.5  | 65.1    | 157    | 169    | 181 | 6 |
| 22 FT                                 | 17                  | 18 | 14 | 11 | 6             | 7.5  | 6    | 6.5  | 69.0    | 41.0   | 41.0   | 41.0   | 6       | 14   | 53.0  | 58.0 | 6       | 14   | 37.0 | 39.0 | 6                | 6    | 6    | 6    | 64.5    | 158    | 170    | 182 | 6 |
| 24 FT                                 | 18                  | 20 | 15 | 11 | 6             | 7    | 6    | 6.5  | 68.9    | 42.0   | 42.0   | 42.0   | 6       | 13   | 52.0  | 58.0 | 6       | 13   | 36.0 | 38.0 | 6                | 6    | 6    | 6    | 64.6    | 160    | 172    | 184 | 6 |
| 26 FT                                 | 19                  | 21 | 15 | 11 | 6             | 6.5  | 6    | 6    | 68.6    | 43.0   | 43.0   | 43.0   | 6       | 13   | 52.0  | 57.0 | 6       | 13   | 36.0 | 38.0 | 6                | 6    | 6    | 6    | 64.3    | 161    | 173    | 185 | 7 |
| 28 FT                                 | 20                  | 22 | 16 | 11 | 6             | 6.5  | 6    | 6    | 68.6    | 44.0   | 44.0   | 44.0   | 6       | 12   | 51.0  | 57.0 | 6       | 12   | 35.0 | 37.0 | 6                | 6    | 6    | 6    | 63.9    | 162    | 174    | 186 | 7 |
| 30 FT                                 | 21                  | 23 | 17 | 11 | 6             | 6    | 6    | 6    | 69.0    | 45.0   | 45.0   | 45.0   | 6       | 12   | 51.0  | 57.0 | 6       | 12   | 34.0 | 36.0 | 7                | 8    | 6    | 6.5  | 64.0    | 163    | 175    | 187 | 7 |
| 32 FT                                 | 21                  | 24 | 17 | 11 | 6             | 6    | 6    | 6    | 68.6    | 45.0   | 45.0   | 45.0   | 6       | 12   | 51.0  | 57.0 | 6       | 12   | 35.0 | 37.0 | 7                | 7.5  | 6    | 6.5  | 64.1    | 164    | 176    | 188 | 7 |
| 34 FT                                 | 22                  | 25 | 18 | 11 | 6             | 6    | 6    | 6    | 69.1    | 46.0   | 46.0   | 46.0   | 7       | 15   | 55.0  | 62.0 | 7       | 15   | 40.0 | 41.0 | 7                | 7.5  | 6    | 6.5  | 64.4    | 165    | 177    | 189 | 7 |
| 36 FT                                 | 23                  | 26 | 18 | 11 | 7             | 7.5  | 7    | 7.5  | 74.3    | 47.0   | 47.0   | 47.0   | 7       | 15   | 55.0  | 61.0 | 7       | 15   | 39.0 | 41.0 | 7                | 7.5  | 6    | 6    | 64.5    | 166    | 178    | 190 | 7 |
| 38 FT                                 | 24                  | 26 | 18 | 11 | 7             | 7.5  | 7    | 8    | 72.6    | 48.0   | 48.0   | 48.0   | 7       | 14   | 55.0  | 61.0 | 7       | 14   | 38.0 | 40.0 | 7                | 7    | 6    | 6.5  | 62.4    | 166    | 178    | 190 | 7 |
| 40 FT                                 | 25                  | 27 | 18 | 11 | 7             | 7    | 7    | 7    | 72.9    | 49.0   | 49.0   | 49.0   | 7       | 14   | 55.0  | 61.0 | 7       | 14   | 38.0 | 39.0 | 7                | 7    | 6    | 6    | 62.6    | 167    | 179    | 191 | 7 |
| 42 FT                                 | 25                  | 28 | 19 | 11 | 7             | 7    | 7    | 7    | 73.3    | 49.0   | 49.0   | 49.0   | 7       | 14   | 55.0  | 60.0 | 7       | 14   | 38.0 | 40.0 | 7                | 7    | 6    | 6    | 62.9    | 168    | 180    | 192 | 7 |
| 44 FT                                 | 26                  | 29 | 20 | 11 | 7             | 7    | 7    | 7.5  | 74.0    | 50.0   | 50.0   | 50.0   | 7       | 13   | 54.0  | 60.0 | 7       | 13   | 38.0 | 39.0 | 7                | 7    | 6    | 6    | 63.3    | 169    | 181    | 193 | 7 |
| 46 FT                                 | 27                  | 30 | 21 | 11 | 7             | 6.5  | 7    | 7.5  | 74.6    | 51.0   | 51.0   | 51.0   | 7       | 13   | 54.0  | 59.0 | 7       | 13   | 37.0 | 38.0 | 7                | 7    | 6    | 6    | 63.6    | 170    | 182    | 194 | 7 |
| 48 FT                                 | 27                  | 30 | 21 | 11 | 7             | 6    | 7    | 7    | 74.5    | 51.0   | 51.0   | 51.0   | 7       | 12   | 54.0  | 59.0 | 7       | 12   | 37.0 | 39.0 | 7                | 6    | 6    | 6    | 63.5    | 170    | 182    | 194 | 7 |
| 50 FT                                 | 28                  | 31 | 22 | 11 | 7             | 6.5  | 7    | 7    | 75.3    | 52.0   | 52.0   | 58.0   | 7       | 13   | 54.0  | 59.0 | 7       | 13   | 37.0 | 38.0 | 7                | 6.5  | 7    | 7.5  | 67.0    | 171    | 183    | 195 | 7 |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**CONCRETE TRIPLE BOX CULVERT**  
MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS  
SPAN (S): 11 FEET  
HEIGHT (HT): 12 THRU 14 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.87A

SHEET NO.  
17 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| SPAN (S) = 12 FT |                  |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         |      |         | HEIGHT (HT) = 6 FT OR 7 FT OR 8 FT |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------|---------|------------------------------------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |      |         |                                    | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |      | B2 BARS |                                    |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA. | C7      | Q10                                | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=6' | HT=7'   | HT=8' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=6' | HT=7' | HT=8' |         |      |         |                                    |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 9  | 8  | 8  | 5             | 6    | 4       | 6    | 59.1 | 30.0  | 30.0    | 30.0  | 5    | 12   | 114.5   | 86.5 | 5    | 12   | 31.0    | 34.0 | 5                | 7.5  | 6    | 7    | 54.6    | 77    | 89    | 101   | 6       | 6.5  | 53.0    | 56.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 14               | 9  | 8  | 8  | 5             | 6    | 5       | 8.5  | 62.1 | 30.0  | 30.0    | 34.0  | 5    | 12   | 116.5   | 86.5 | 5    | 12   | 30.0    | 33.0 | 5                | 7.5  | 6    | 6.5  | 50.3    | 77    | 89    | 101   | 6       | 6    | 52.0    | 55.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 14               | 10 | 8  | 8  | 5             | 6    | 5       | 6.5  | 62.1 | 31.0  | 31.0    | 34.0  | 5    | 12   | 116.5   | 88.0 | 5    | 12   | 33.0    | 35.0 | 5                | 7    | 6    | 6.5  | 50.3    | 78    | 90    | 102   | 6       | 6    | 52.0    | 56.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 10 | 8  | 8  | 5             | 6    | 5       | 6.5  | 48.9 | 31.0  | 31.0    | 31.0  | 5    | 12   | 69.0    | 88.0 | 5    | 12   | 33.0    | 35.0 | 5                | 7    | 5    | 6    | 42.6    | 78    | 90    | 102   | 6       | 6    | 51.0    | 56.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 11 | 8  | 8  | 5             | 6.5  | 5       | 6.5  | 42.8 | 31.0  | 31.0    | 31.0  | 6    | 16   | 59.0    | 71.0 | 6    | 16   | 34.0    | 36.0 | 5                | 6.5  | 5    | 6.5  | 39.3    | 79    | 91    | 103   | 6       | 6.5  | 49.0    | 56.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11               | 12 | 8  | 8  | 5             | 6.5  | 5       | 6    | 39.9 | 31.0  | 31.0    | 31.0  | 6    | 14   | 55.0    | 61.0 | 6    | 14   | 33.0    | 34.0 | 5                | 6    | 5    | 7.5  | 36.6    | 80    | 92    | 104   | 6       | 6.5  | 48.0    | 56.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12               | 13 | 8  | 8  | 5             | 6.5  | 5       | 6.5  | 37.3 | 32.0  | 32.0    | 32.0  | 6    | 14   | 52.0    | 59.0 | 6    | 14   | 32.0    | 34.0 | 5                | 6    | 5    | 7.5  | 34.9    | 81    | 93    | 105   | 6       | 6    | 47.0    | 56.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 13               | 14 | 8  | 8  | 5             | 6    | 5       | 7    | 35.4 | 33.0  | 33.0    | 33.0  | 6    | 14   | 51.0    | 58.0 | 6    | 14   | 32.0    | 34.0 | 6                | 8    | 5    | 8    | 33.8    | 82    | 94    | 106   | 6       | 6    | 47.0    | 56.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 14               | 15 | 8  | 8  | 5             | 6    | 5       | 7    | 33.9 | 34.0  | 34.0    | 34.0  | 6    | 13   | 49.0    | 57.0 | 6    | 13   | 32.0    | 34.0 | 6                | 7.5  | 5    | 8    | 32.8    | 83    | 95    | 107   | 6       | 6    | 47.0    | 56.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 15               | 16 | 8  | 8  | 6             | 8    | 5       | 6.5  | 37.9 | 35.0  | 35.0    | 35.0  | 6    | 13   | 55.0    | 63.0 | 6    | 13   | 37.0    | 40.0 | 6                | 7    | 5    | 8    | 32.1    | 84    | 96    | 108   | 6       | 6    | 46.0    | 56.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 16               | 17 | 8  | 8  | 6             | 8    | 5       | 6.5  | 37.0 | 36.0  | 36.0    | 36.0  | 6    | 13   | 54.0    | 63.0 | 6    | 13   | 37.0    | 40.0 | 6                | 7    | 5    | 7    | 31.6    | 85    | 97    | 109   | 6       | 6    | 46.0    | 56.0                               | 5         | 12   | 5    | 11.5 | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 17               | 18 | 8  | 8  | 6             | 7.5  | 5       | 6.5  | 36.4 | 37.0  | 37.0    | 37.0  | 6    | 12   | 53.0    | 63.0 | 6    | 12   | 37.0    | 40.0 | 6                | 6.5  | 5    | 6.5  | 31.1    | 86    | 98    | 110   | 6       | 6    | 46.0    | 56.0                               | 5         | 12   | 5    | 10   | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 18               | 20 | 8  | 8  | 6             | 6.5  | 5       | 6    | 36.1 | 38.0  | 38.0    | 38.0  | 6    | 12   | 53.0    | 62.0 | 6    | 12   | 37.0    | 40.0 | 6                | 6    | 5    | 6    | 30.8    | 88    | 100   | 112   | 6       | 6    | 46.0    | 57.0                               | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 20               | 21 | 8  | 8  | 6             | 6.5  | 6       | 7.5  | 39.5 | 44.0  | 44.0    | 44.0  | 6    | 12   | 52.0    | 62.0 | 6    | 12   | 36.0    | 39.0 | 7                | 8    | 6    | 7.5  | 33.8    | 89    | 101   | 113   | 7       | 7.5  | 49.0    | 59.0                               | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 21               | 22 | 8  | 8  | 6             | 6    | 6       | 7    | 39.3 | 45.0  | 45.0    | 45.0  | 6    | 12   | 52.0    | 62.0 | 6    | 12   | 36.0    | 39.0 | 7                | 7.5  | 6    | 7    | 33.6    | 90    | 102   | 114   | 7       | 7.5  | 49.0    | 60.0                               | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 22               | 23 | 8  | 8  | 6             | 6    | 6       | 6.5  | 39.0 | 46.0  | 46.0    | 46.0  | 7    | 15   | 57.0    | 67.0 | 7    | 15   | 41.0    | 44.0 | 7                | 7    | 6    | 6.5  | 33.4    | 91    | 103   | 115   | 7       | 7    | 49.0    | 60.0                               | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 23               | 24 | 8  | 8  | 7             | 7.5  | 6       | 6    | 38.9 | 47.0  | 47.0    | 47.0  | 7    | 15   | 56.0    | 67.0 | 7    | 15   | 40.0    | 43.0 | 7                | 6.5  | 6    | 6    | 33.4    | 92    | 104   | 116   | 7       | 6.5  | 49.0    | 60.0                               | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 24               | 25 | 9  | 8  | 7             | 7.5  | 6       | 7    | 39.8 | 48.0  | 48.0    | 48.0  | 7    | 14   | 56.0    | 66.0 | 7    | 14   | 40.0    | 42.0 | 7                | 6.5  | 6    | 7    | 34.0    | 93    | 105   | 117   | 7       | 6.5  | 49.0    | 60.0                               | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 25               | 26 | 9  | 8  | 7             | 7    | 6       | 6.5  | 39.8 | 49.0  | 49.0    | 49.0  | 7    | 14   | 56.0    | 66.0 | 7    | 14   | 39.0    | 42.0 | 7                | 6    | 6    | 6.5  | 34.0    | 94    | 106   | 118   | 7       | 6    | 49.0    | 60.0                               | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 26               | 27 | 9  | 8  | 7             | 7    | 6       | 6.5  | 39.8 | 50.0  | 50.0    | 50.0  | 7    | 13   | 56.0    | 66.0 | 7    | 13   | 39.0    | 41.0 | 7                | 6    | 6    | 6.5  | 34.1    | 95    | 107   | 119   | 7       | 6    | 49.0    | 60.0                               | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 27               | 28 | 9  | 8  | 7             | 6.5  | 6       | 6    | 39.8 | 51.0  | 51.0    | 51.0  | 7    | 13   | 56.0    | 66.0 | 7    | 13   | 38.0    | 40.0 | 7                | 6    | 6    | 6    | 34.3    | 96    | 108   | 120   | 7       | 6    | 49.0    | 60.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 28               | 29 | 9  | 8  | 7             | 6.5  | 6       | 6    | 38.9 | 52.0  | 52.0    | 52.0  | 7    | 12   | 56.0    | 65.0 | 7    | 12   | 37.0    | 39.0 | 7                | 6.5  | 6    | 6    | 33.4    | 97    | 109   | 121   | 8       | 7.5  | 55.0    | 66.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 28               | 30 | 10 | 8  | 7             | 6    | 6       | 6.5  | 39.8 | 52.0  | 52.0    | 52.0  | 7    | 12   | 56.0    | 65.0 | 7    | 12   | 38.0    | 40.0 | 7                | 6.5  | 6    | 6.5  | 33.9    | 98    | 110   | 122   | 8       | 7.5  | 55.0    | 66.0                               | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 29               | 31 | 10 | 8  | 7             | 6    | 6       | 6.5  | 39.9 | 53.0  | 53.0    | 53.0  | 7    | 12   | 55.0    | 64.0 | 7    | 12   | 38.0    | 39.0 | 7                | 6.5  | 6    | 6    | 34.0    | 99    | 111   | 123   | 8       | 7.5  | 55.0    | 66.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 30               | 32 | 10 | 8  | 7             | 6    | 6       | 6    | 40.0 | 54.0  | 54.0    | 54.0  | 7    | 12   | 55.0    | 64.0 | 7    | 12   | 37.0    | 38.0 | 7                | 6    | 6    | 6    | 34.3    | 100   | 112   | 124   | 8       | 7.5  | 55.0    | 66.0                               | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 31               | 33 | 10 | 8  | 8             | 7.5  | 6       | 6    | 40.1 | 55.0  | 55.0    | 55.0  | 8    | 15   | 63.0    | 71.0 | 8    | 15   | 45.0    | 46.0 | 7                | 6    | 7    | 6.5  | 37.5    | 101   | 113   | 125   | 8       | 7.5  | 55.0    | 66.0                               | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 32               | 34 | 11 | 8  | 8             | 7.5  | 6       | 6.5  | 41.0 | 56.0  | 56.0    | 56.0  | 7    | 12   | 55.0    | 63.0 | 7    | 12   | 37.0    | 38.0 | 7                | 6    | 6    | 6    | 35.1    | 102   | 114   | 126   | 8       | 7    | 55.0    | 66.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 12 FT |                  |    |    |    |               |      |         |      |      |       |         |        |      |      |         |      |      |      |         |      |                  |      |      |      |         |     |       |        |        | HEIGHT (HT) = 9 FT OR 10 FT OR 11 FT |      |      |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|--------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-----|-------|--------|--------|--------------------------------------|------|------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |        |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |     |       |        |        |                                      |      |      | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |        |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |     |       |        |        |                                      |      |      |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |        | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3  |       |        | SIZE   | SPA.                                 | C7   | Q10  | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=9' | HT=10'  | HT=11' |      |      |         |      |      |      |         |      |                  |      |      |      |         |     | HT=9' | HT=10' | HT=11' |                                      |      |      |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 8  | 9  | 5             | 6    | 5       | 7.5  | 62.3 | 34.0  | 34.0    | 34.0   | 5    | 12   | 117.5   | 87.5 | 5    | 12   | 31.0    | 35.0 | 5                | 7.5  | 6    | 6    | 79.4    | 114 | 126   | 138    | 5      | 6                                    | 51.0 | 54.0 | 5         | 12   | 5    | 10   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 14               | 10 | 9  | 9  | 5             | 6    | 5       | 8    | 62.9 | 34.0  | 34.0    | 34.0   | 5    | 12   | 117.5   | 87.5 | 5    | 12   | 30.0    | 33.0 | 5                | 7    | 6    | 6.5  | 68.6    | 114 | 126   | 138    | 6      | 6.5                                  | 53.0 | 56.0 | 5         | 12   | 5    | 10.5 | 12 |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 14               | 10 | 9  | 9  | 5             | 6    | 6       | 7    | 75.1 | 34.0  | 34.0    | 35.0   | 5    | 12   | 117.5   | 89.0 | 5    | 12   | 34.0    | 36.0 | 5                | 7    | 6    | 6    | 68.6    | 114 | 126   | 138    | 6      | 6                                    | 53.0 | 56.0 | 5         | 12   | 5    | 10   | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 10 | 9  | 9  | 5             | 6    | 6       | 7    | 75.1 | 31.0  | 31.0    | 35.0   | 5    | 12   | 82.0    | 89.0 | 5    | 12   | 34.0    | 36.0 | 5                | 7    | 6    | 6    | 61.3    | 114 | 126   | 138    | 6      | 6                                    | 52.0 | 56.0 | 5         | 12   | 5    | 10   | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 11 | 9  | 9  | 5             | 6.5  | 6       | 7    | 59.8 | 31.0  | 31.0    | 35.0   | 6    | 16   | 61.0    | 70.0 | 6    | 16   | 35.0    | 36.0 | 5                | 6.5  | 6    | 6    | 57.5    | 115 | 127   | 139    | 6      | 6                                    | 50.0 | 56.0 | 5         | 12   | 5    | 9.5  | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11               | 12 | 9  | 9  | 5             | 6.5  | 6       | 7    | 55.3 | 31.0  | 31.0    | 35.0   | 6    | 15   | 56.0    | 60.0 | 6    | 15   | 33.0    | 34.0 | 5                | 6    | 6    | 6.5  | 54.5    | 116 | 128   | 140    | 6      | 6                                    | 49.0 | 56.0 | 5         | 12   | 5    | 9    | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12               | 13 | 9  | 9  | 5             | 6.5  | 6       | 6.5  | 52.5 | 32.0  | 32.0    | 36.0   | 6    | 14   | 54.0    | 59.0 | 6    | 14   | 33.0    | 34.0 | 5                | 6    | 6    | 6.5  | 52.4    | 117 | 129   | 141    | 6      | 6                                    | 48.0 | 56.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 13               | 14 | 9  | 9  | 5             | 6    | 6       | 6.5  | 50.4 | 33.0  | 33.0    | 37.0   | 6    | 14   | 52.0    | 58.0 | 6    | 14   | 32.0    | 34.0 | 6                | 8    | 6    | 6.5  | 50.6    | 118 | 130   | 142    | 6      | 6                                    | 48.0 | 56.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 14               | 15 | 9  | 9  | 5             | 6    | 6       | 6.5  | 48.8 | 34.0  | 34.0    | 38.0   | 6    | 14   | 51.0    | 57.0 | 6    | 14   | 32.0    | 34.0 | 6                | 7.5  | 6    | 6.5  | 49.4    | 119 | 131   | 143    | 6      | 6                                    | 48.0 | 56.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 15               | 16 | 10 | 9  | 6             | 8    | 6       | 7.5  | 54.3 | 35.0  | 35.0    | 39.0   | 6    | 13   | 55.0    | 63.0 | 6    | 13   | 38.0    | 40.0 | 6                | 7    | 6    | 7.5  | 48.5    | 120 | 132   | 144    | 6      | 6                                    | 47.0 | 56.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 16               | 17 | 11 | 9  | 6             | 8    | 6       | 8    | 54.3 | 36.0  | 36.0    | 36.0   | 6    | 13   | 55.0    | 62.0 | 6    | 13   | 38.0    | 40.0 | 6                | 7    | 5    | 6    | 45.4    | 121 | 133   | 145    | 6      | 6                                    | 47.0 | 56.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 17               | 18 | 11 | 9  | 6             | 7.5  | 6       | 7.5  | 53.6 | 37.0  | 37.0    | 41.0   | 6    | 13   | 54.0    | 62.0 | 6    | 13   | 37.0    | 40.0 | 6                | 6    | 6    | 8    | 47.8    | 122 | 134   | 146    | 6      | 6                                    | 47.0 | 56.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 18               | 20 | 11 | 9  | 6             | 7    | 6       | 6.5  | 53.3 | 38.0  | 38.0    | 42.0   | 6    | 12   | 54.0    | 62.0 | 6    | 12   | 37.0    | 40.0 | 6                | 6    | 6    | 7.5  | 47.5    | 124 | 136   | 148    | 6      | 6                                    | 47.0 | 57.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 19               | 21 | 12 | 9  | 6             | 6.5  | 6       | 7    | 53.5 | 39.0  | 39.0    | 39.0   | 6    | 12   | 53.0    | 62.0 | 6    | 12   | 37.0    | 40.0 | 7                | 8    | 5    | 6    | 44.5    | 125 | 137   | 149    | 7      | 7.5                                  | 50.0 | 60.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 20               | 22 | 13 | 9  | 6             | 6    | 6       | 7.5  | 53.9 | 40.0  | 40.0    | 40.0   | 6    | 12   | 53.0    | 61.0 | 6    | 12   | 37.0    | 40.0 | 7                | 7.5  | 5    | 6    | 44.6    | 126 | 138   | 150    | 7      | 7.5                                  | 50.0 | 60.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 22               | 23 | 13 | 9  | 6             | 6    | 6       | 7.5  | 53.5 | 42.0  | 42.0    | 42.0   | 7    | 15   | 57.0    | 66.0 | 7    | 15   | 40.0    | 43.0 | 7                | 7    | 5    | 6    | 44.5    | 127 | 139   | 151    | 7      | 7                                    | 50.0 | 60.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 23               | 25 | 13 | 9  | 7             | 7.5  | 6       | 7    | 53.4 | 43.0  | 43.0    | 43.0   | 7    | 15   | 57.0    | 66.0 | 7    | 15   | 40.0    | 42.0 | 7                | 7    | 5    | 6    | 44.4    | 129 | 141   | 153    | 7      | 6.5                                  | 50.0 | 60.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 24               | 26 | 13 | 9  | 7             | 7.5  | 6       | 6.5  | 53.3 | 44.0  | 44.0    | 48.0   | 7    | 14   | 57.0    | 66.0 | 7    | 14   | 40.0    | 42.0 | 7                | 7    | 6    | 8.5  | 47.4    | 130 | 142   | 154    | 7      | 6.5                                  | 50.0 | 60.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 25               | 26 | 13 | 9  | 7             | 7    | 6       | 6    | 53.0 | 45.0  | 45.0    | 49.0   | 7    | 14   | 57.0    | 65.0 | 7    | 14   | 39.0    | 41.0 | 7                | 6    | 6    | 7.5  | 47.3    | 130 | 142   | 154    | 7      | 6                                    | 50.0 | 60.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 26               | 28 | 14 | 9  | 7             | 7    | 6       | 6.5  | 53.9 | 46.0  | 46.0    | 46.0   | 7    | 13   | 56.0    | 65.0 | 7    | 13   | 38.0    | 40.0 | 7                | 7    | 5    | 6    | 44.9    | 132 | 144   | 156    | 7      | 6                                    | 50.0 | 60.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 26               | 29 | 15 | 9  | 7             | 6.5  | 6       | 6.5  | 54.6 | 50.0  | 50.0    | 50.0   | 7    | 13   | 56.0    | 65.0 | 7    | 13   | 39.0    | 41.0 | 7                | 6.5  | 6    | 8    | 48.1    | 133 | 145   | 157    | 7      | 6                                    | 50.0 | 60.0 | 5         | 12   | 6    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 27               | 29 | 15 | 9  | 7             | 6.5  | 6       | 7    | 53.4 | 51.0  | 51.0    | 51.0   | 7    | 13   | 56.0    | 64.0 | 7    | 13   | 38.0    | 40.0 | 7                | 6    | 6    | 8    | 46.9    | 133 | 145   | 157    | 8      | 7.5                                  | 56.0 | 66.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 28               | 30 | 15 | 9  | 7             | 6.5  | 6       | 6.5  | 53.4 | 52.0  | 52.0    | 52.0   | 7    | 12   | 56.0    | 64.0 | 7    | 12   | 38.0    | 39.0 | 7                | 6    | 6    | 8    | 47.0    | 134 | 146   | 158    | 8      | 7.5                                  | 56.0 | 66.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 29               | 31 | 15 | 9  | 7             | 6    | 6       | 6.5  | 53.4 | 53.0  | 53.0    | 53.0   | 7    | 12   | 56.0    | 63.0 | 7    | 12   | 37.0    | 39.0 | 7                | 6    | 6    | 7.5  | 47.1    | 135 | 147   | 159    | 8      | 7.5                                  | 56.0 | 66.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 30               | 32 | 15 | 9  | 7             | 6    | 6       | 6.5  | 53.5 | 54.0  | 54.0    | 54.0   | 7    | 12   | 55.0    | 63.0 | 7    | 12   | 37.0    | 38.0 | 7                | 6    | 6    | 7.5  | 47.4    | 136 | 148   | 160    | 8      | 7.5                                  | 56.0 | 66.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 31               | 33 | 15 | 9  | 7             | 6    | 6       | 6    | 53.5 | 55.0  | 55.0    | 55.0   | 7    | 12   | 55.0    | 62.0 | 7    | 12   | 37.0    | 38.0 | 7                | 6    | 6    | 7    | 47.5    | 137 | 149   | 161    | 8      | 7                                    | 56.0 | 66.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 31               | 34 | 16 | 9  | 8             | 7.5  | 6       | 6    | 54.4 | 55.0  | 55.0    | 55.0   | 7    | 12   | 55.0    | 62.0 | 7    | 12   | 37.0    | 38.0 | 7                | 6    | 6    | 7    | 47.9    | 138 | 150   | 162    | 8      | 7                                    | 56.0 | 67.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |



| SPAN (S) = 12 FT |                  |    |    |    |               |      |         |      |      |        |         |      |      |       |         |      |      |      |         |      |                  |      |      |      |         |        |      |      |         | HEIGHT (HT) = 12 FT OR 13 FT |           |      |      |      |    |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|--------|---------|------|------|-------|---------|------|------|------|---------|------|------------------|------|------|------|---------|--------|------|------|---------|------------------------------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |         |      |      |       |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |        |      |      |         |                              | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |        | H1 BARS |      |      |       | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |        |      |      | B1 BARS |                              | B2 BARS   |      |      |      |    |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |         | SIZE | SPA. | C5    | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4   | K3      |        | SIZE | SPA. | C7      | Q10                          | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=12' | HT=13'  |      |      |       |         |      |      |      |         |      |                  |      |      |      | HT=12'  | HT=13' |      |      |         |                              |           |      |      |      |    |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 10 | 10 | 5             | 6    | 5       | 7    | 63.8 | 34.0   | 34.0    | 5    | 12   | 118.5 | 87.5    | 5    | 12   | 32.0 | 35.0    | 5    | 7                | 6    | 6.5  | 89.1 | 150     | 162    | 6    | 7    | 55.0    | 57.0                         | 5         | 12   | 5    | 8.5  | 12 |  |  |  |  |  |  |  |  |  |
| 2 FT             | 14               | 10 | 10 | 10 | 5             | 6    | 5       | 7    | 63.8 | 34.0   | 34.0    | 5    | 12   | 118.5 | 87.5    | 5    | 12   | 31.0 | 33.0    | 5    | 7                | 6    | 6    | 79.6 | 150     | 162    | 6    | 6.5  | 54.0    | 56.0                         | 5         | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 14               | 11 | 10 | 10 | 5             | 6    | 5       | 6    | 63.8 | 34.0   | 34.0    | 5    | 12   | 118.5 | 89.0    | 5    | 12   | 34.0 | 35.0    | 5    | 6.5              | 6    | 6    | 79.6 | 151     | 163    | 6    | 6.5  | 54.0    | 57.0                         | 5         | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 11 | 10 | 10 | 5             | 6.5  | 5       | 6    | 63.8 | 31.0   | 31.0    | 5    | 12   | 118.5 | 89.0    | 5    | 12   | 34.0 | 35.0    | 5    | 6.5              | 6    | 6.5  | 76.3 | 151     | 163    | 6    | 6.5  | 53.0    | 57.0                         | 5         | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 11 | 10 | 10 | 5             | 6.5  | 5       | 6    | 71.3 | 31.0   | 31.0    | 6    | 16   | 65.0  | 69.0    | 6    | 16   | 35.0 | 36.0    | 5    | 6.5              | 6    | 6    | 69.1 | 151     | 163    | 6    | 6    | 51.0    | 56.0                         | 5         | 12   | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |
| 8 FT             | 11               | 12 | 10 | 10 | 5             | 6.5  | 6       | 7    | 65.4 | 31.0   | 35.0    | 6    | 15   | 57.0  | 60.0    | 6    | 15   | 34.0 | 35.0    | 5    | 6                | 6    | 6    | 66.4 | 152     | 164    | 6    | 6    | 50.0    | 56.0                         | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12               | 13 | 10 | 10 | 5             | 6.5  | 6       | 7    | 62.9 | 36.0   | 36.0    | 6    | 15   | 55.0  | 58.0    | 6    | 15   | 33.0 | 34.0    | 5    | 6                | 6    | 6    | 63.8 | 153     | 165    | 6    | 6    | 49.0    | 56.0                         | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 13               | 14 | 11 | 10 | 5             | 6.5  | 6       | 7.5  | 61.1 | 33.0   | 37.0    | 6    | 14   | 53.0  | 57.0    | 6    | 14   | 33.0 | 34.0    | 6    | 8                | 6    | 7    | 62.0 | 154     | 166    | 6    | 6    | 49.0    | 56.0                         | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 14               | 15 | 11 | 10 | 5             | 6    | 6       | 7    | 59.9 | 38.0   | 38.0    | 6    | 14   | 51.0  | 57.0    | 6    | 14   | 32.0 | 34.0    | 6    | 7.5              | 6    | 6    | 60.9 | 155     | 167    | 6    | 6    | 48.0    | 56.0                         | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 15               | 16 | 12 | 10 | 6             | 8    | 6       | 7    | 65.0 | 39.0   | 39.0    | 6    | 14   | 56.0  | 62.0    | 6    | 14   | 38.0 | 40.0    | 6    | 7                | 6    | 7    | 59.9 | 156     | 168    | 6    | 6    | 48.0    | 56.0                         | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 16               | 17 | 12 | 10 | 6             | 8    | 6       | 6.5  | 64.1 | 40.0   | 40.0    | 6    | 13   | 55.0  | 62.0    | 6    | 13   | 38.0 | 40.0    | 6    | 7                | 6    | 6    | 59.1 | 157     | 169    | 6    | 6    | 48.0    | 56.0                         | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 17               | 18 | 13 | 10 | 6             | 7.5  | 6       | 6.5  | 63.8 | 41.0   | 41.0    | 6    | 13   | 55.0  | 61.0    | 6    | 13   | 38.0 | 40.0    | 6    | 6                | 6    | 7    | 58.5 | 158     | 170    | 6    | 6    | 48.0    | 56.0                         | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 18               | 20 | 13 | 10 | 6             | 7    | 6       | 6    | 63.3 | 42.0   | 42.0    | 6    | 13   | 54.0  | 61.0    | 6    | 13   | 38.0 | 40.0    | 6    | 6                | 6    | 6.5  | 58.4 | 160     | 172    | 6    | 6    | 48.0    | 56.0                         | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 19               | 21 | 14 | 10 | 6             | 6.5  | 6       | 6.5  | 63.1 | 39.0   | 43.0    | 6    | 12   | 54.0  | 61.0    | 6    | 12   | 37.0 | 40.0    | 7    | 8                | 6    | 7    | 58.0 | 161     | 173    | 7    | 7.5  | 51.0    | 60.0                         | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 20               | 22 | 14 | 10 | 6             | 6.5  | 6       | 6    | 62.8 | 44.0   | 44.0    | 6    | 12   | 53.0  | 61.0    | 6    | 12   | 37.0 | 40.0    | 7    | 7.5              | 6    | 6.5  | 57.6 | 162     | 174    | 7    | 7.5  | 51.0    | 60.0                         | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 21               | 23 | 15 | 10 | 6             | 6    | 6       | 6    | 62.9 | 45.0   | 45.0    | 6    | 12   | 53.0  | 61.0    | 6    | 12   | 37.0 | 40.0    | 7    | 7                | 6    | 7    | 57.4 | 163     | 175    | 7    | 7    | 51.0    | 60.0                         | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 23               | 25 | 15 | 10 | 7             | 7.5  | 6       | 6    | 62.8 | 47.0   | 47.0    | 7    | 15   | 57.0  | 65.0    | 7    | 15   | 40.0 | 42.0    | 7    | 7                | 6    | 7    | 57.5 | 165     | 177    | 7    | 6.5  | 51.0    | 60.0                         | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 23               | 26 | 16 | 10 | 7             | 7    | 6       | 6    | 63.1 | 47.0   | 47.0    | 7    | 14   | 57.0  | 65.0    | 7    | 14   | 41.0 | 43.0    | 7    | 7                | 6    | 7.5  | 57.5 | 166     | 178    | 7    | 6.5  | 51.0    | 60.0                         | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 24               | 27 | 16 | 10 | 7             | 7    | 7       | 7.5  | 68.1 | 48.0   | 48.0    | 7    | 14   | 57.0  | 65.0    | 7    | 14   | 40.0 | 42.0    | 7    | 7                | 6    | 7    | 57.5 | 167     | 179    | 7    | 6    | 51.0    | 60.0                         | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 25               | 28 | 17 | 10 | 7             | 7    | 6       | 6    | 63.6 | 49.0   | 49.0    | 7    | 14   | 57.0  | 64.0    | 7    | 14   | 40.0 | 42.0    | 7    | 7                | 6    | 7    | 57.8 | 168     | 180    | 7    | 6    | 51.0    | 60.0                         | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 26               | 29 | 17 | 10 | 7             | 7    | 7       | 7.5  | 68.6 | 50.0   | 50.0    | 7    | 13   | 57.0  | 64.0    | 7    | 13   | 39.0 | 41.0    | 7    | 6.5              | 6    | 7    | 57.9 | 169     | 181    | 7    | 6    | 51.0    | 60.0                         | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 27               | 29 | 17 | 10 | 7             | 6.5  | 7       | 8    | 66.8 | 51.0   | 51.0    | 7    | 13   | 56.0  | 63.0    | 7    | 13   | 38.0 | 40.0    | 7    | 6                | 6    | 7    | 55.9 | 169     | 181    | 8    | 7.5  | 57.0    | 66.0                         | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 28               | 30 | 17 | 10 | 7             | 6.5  | 7       | 7    | 66.9 | 52.0   | 52.0    | 7    | 12   | 56.0  | 63.0    | 7    | 12   | 38.0 | 39.0    | 7    | 6                | 6    | 7    | 56.0 | 170     | 182    | 8    | 7.5  | 57.0    | 66.0                         | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 29               | 31 | 18 | 10 | 7             | 6    | 7       | 7.5  | 67.8 | 53.0   | 53.0    | 7    | 12   | 56.0  | 62.0    | 7    | 12   | 37.0 | 38.0    | 7    | 6                | 6    | 6.5  | 56.4 | 171     | 183    | 8    | 7.5  | 57.0    | 66.0                         | 5         | 12   | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 29               | 32 | 19 | 10 | 7             | 6    | 7       | 7.5  | 68.5 | 53.0   | 53.0    | 7    | 12   | 56.0  | 62.0    | 7    | 12   | 38.0 | 39.0    | 7    | 6                | 6    | 6.5  | 56.8 | 172     | 184    | 8    | 7    | 57.0    | 67.0                         | 5         | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 30               | 33 | 19 | 10 | 7             | 6    | 7       | 7    | 68.5 | 54.0   | 54.0    | 7    | 12   | 56.0  | 61.0    | 7    | 12   | 37.0 | 38.0    | 7    | 6                | 6    | 6.5  | 56.9 | 173     | 185    | 8    | 7    | 57.0    | 67.0                         | 5         | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 31               | 34 | 19 | 10 | 7             | 6    | 7       | 6.5  | 68.6 | 55.0   | 55.0    | 7    | 12   | 56.0  | 61.0    | 7    | 12   | 37.0 | 38.0    | 7    | 6                | 6    | 6.5  | 57.3 | 174     | 186    | 8    | 7    | 57.0    | 67.0                         | 5         | 12   | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 12 FT |                  |    |    |    |               |      |         |      |      |                  |         |      |    |       |         |      |                  |      |         |      |         |      |     |                  |         |      |    | HEIGHT (HT) = 14 FT OR 15 FT |           |      |         |      |    |     |    |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|------------------|---------|------|----|-------|---------|------|------------------|------|---------|------|---------|------|-----|------------------|---------|------|----|------------------------------|-----------|------|---------|------|----|-----|----|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                  |         |      |    |       |         |      | BOTTOM SLAB BARS |      |         |      |         |      |     |                  |         |      |    |                              | WALL BARS |      |         |      |    |     |    |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                  | H1 BARS |      |    |       | H2 BARS |      |                  |      | A2 BARS |      | J4 BARS |      |     |                  | H3 BARS |      |    |                              | B1 BARS   |      | B2 BARS |      |    |     |    |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2               | SIZE    | SPA. | C5 | Q8    | SIZE    | SPA. | C6               | Q9   | SIZE    | SPA. | SIZE    | SPA. | C4  | K3               | SIZE    | SPA. | C7 | Q10                          | SIZE      | SPA. | SIZE    | SPA. | G1 |     |    |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=14'<br>HT=15' |         |      |    |       |         |      |                  |      |         |      |         |      |     | HT=14'<br>HT=15' |         |      |    |                              |           |      |         |      |    |     |    |  |  |  |  |
| 1 FT             | 14               | 11 | 10 | 12 | 5             | 6    | 6       | 7.5  | 64.0 | 34.0             | 38.0    | 5    | 12 | 119.5 | 88.5    | 5    | 12               | 32.0 | 35.0    | 5    | 7       | 6    | 6   | 95.5             | 175     | 187  | 5  | 6                            | 55.0      | 55.0 | 5       | 12   | 5  | 8   | 12 |  |  |  |  |
| 2 FT             | 14               | 12 | 10 | 12 | 5             | 6    | 6       | 7    | 64.0 | 34.0             | 38.0    | 5    | 12 | 119.5 | 88.5    | 5    | 12               | 31.0 | 34.0    | 5    | 7       | 6    | 6   | 95.5             | 176     | 188  | 5  | 6                            | 54.0      | 55.0 | 5       | 12   | 5  | 8   | 12 |  |  |  |  |
| 2'- 4'           | 14               | 12 | 12 | 12 | 5             | 6    | 6       | 7    | 68.3 | 34.0             | 38.0    | 6    | 15 | 121.5 | 88.5    | 6    | 15               | 37.0 | 37.0    | 5    | 6.5     | 6    | 6   | 95.5             | 176     | 188  | 6  | 6.5                          | 55.0      | 57.0 | 5       | 11   | 5  | 7   | 12 |  |  |  |  |
| 4 FT             | 10               | 11 | 12 | 12 | 5             | 6    | 6       | 7.5  | 68.3 | 34.0             | 34.0    | 6    | 15 | 121.5 | 77.0    | 6    | 15               | 37.0 | 37.0    | 5    | 6.5     | 6    | 6   | 86.8             | 175     | 187  | 6  | 6.5                          | 55.0      | 57.0 | 5       | 11   | 5  | 7   | 12 |  |  |  |  |
| 6 FT             | 10               | 12 | 12 | 12 | 5             | 6.5  | 6       | 7    | 80.0 | 34.0             | 34.0    | 6    | 15 | 61.0  | 61.0    | 6    | 15               | 35.0 | 35.0    | 5    | 6       | 6    | 6.5 | 83.1             | 176     | 188  | 6  | 6.5                          | 53.0      | 57.0 | 5       | 12   | 5  | 7   | 12 |  |  |  |  |
| 8 FT             | 11               | 12 | 12 | 12 | 5             | 7    | 6       | 7.5  | 76.8 | 35.0             | 35.0    | 6    | 15 | 58.0  | 59.0    | 6    | 15               | 35.0 | 35.0    | 5    | 6       | 6    | 6   | 77.1             | 176     | 188  | 6  | 6                            | 52.0      | 55.0 | 5       | 12   | 5  | 7   | 0  |  |  |  |  |
| 10 FT            | 12               | 13 | 12 | 12 | 5             | 6.5  | 6       | 7.5  | 74.4 | 36.0             | 36.0    | 6    | 15 | 56.0  | 58.0    | 6    | 15               | 34.0 | 35.0    | 5    | 6       | 6    | 6   | 75.5             | 177     | 189  | 6  | 6                            | 51.0      | 55.0 | 5       | 12   | 5  | 6.5 | 0  |  |  |  |  |
| 12 FT            | 13               | 14 | 13 | 12 | 5             | 6.5  | 6       | 7.5  | 71.5 | 37.0             | 37.0    | 6    | 15 | 54.0  | 57.0    | 6    | 15               | 34.0 | 35.0    | 6    | 8       | 6    | 6   | 73.0             | 178     | 190  | 6  | 6                            | 50.0      | 55.0 | 5       | 12   | 5  | 6.5 | 0  |  |  |  |  |
| 14 FT            | 14               | 15 | 13 | 12 | 5             | 6    | 6       | 6.5  | 70.3 | 38.0             | 38.0    | 6    | 14 | 52.0  | 56.0    | 6    | 14               | 33.0 | 35.0    | 6    | 7.5     | 6    | 6   | 72.0             | 179     | 191  | 6  | 6                            | 50.0      | 55.0 | 5       | 12   | 5  | 6.5 | 0  |  |  |  |  |
| 16 FT            | 15               | 16 | 14 | 12 | 6             | 8    | 6       | 6.5  | 74.5 | 39.0             | 39.0    | 6    | 14 | 57.0  | 62.0    | 6    | 14               | 39.0 | 41.0    | 6    | 7       | 6    | 6.5 | 70.3             | 180     | 192  | 6  | 6                            | 49.0      | 55.0 | 5       | 12   | 5  | 6   | 0  |  |  |  |  |
| 18 FT            | 15               | 17 | 15 | 12 | 6             | 7.5  | 6       | 6.5  | 72.4 | 39.0             | 39.0    | 6    | 13 | 56.0  | 61.0    | 6    | 13               | 39.0 | 40.0    | 6    | 6.5     | 6    | 6.5 | 69.0             | 181     | 193  | 6  | 6                            | 49.0      | 56.0 | 5       | 12   | 6  | 8   | 0  |  |  |  |  |
| 20 FT            | 17               | 19 | 15 | 12 | 6             | 7.5  | 6       | 6    | 73.0 | 41.0             | 41.0    | 6    | 13 | 56.0  | 61.0    | 6    | 13               | 39.0 | 41.0    | 6    | 6       | 6    | 6   | 69.6             | 183     | 195  | 6  | 6                            | 49.0      | 56.0 | 5       | 12   | 6  | 8   | 0  |  |  |  |  |
| 22 FT            | 18               | 20 | 16 | 12 | 6             | 7    | 6       | 6.5  | 72.8 | 42.0             | 42.0    | 6    | 13 | 55.0  | 61.0    | 6    | 13               | 39.0 | 41.0    | 6    | 6       | 6    | 6   | 68.4             | 184     | 196  | 6  | 6                            | 49.0      | 56.0 | 5       | 12   | 6  | 8   | 0  |  |  |  |  |
| 24 FT            | 19               | 21 | 16 | 12 | 6             | 6.5  | 6       | 6    | 72.4 | 43.0             | 43.0    | 6    | 13 | 55.0  | 61.0    | 6    | 13               | 38.0 | 41.0    | 7    | 8       | 7    | 7.5 | 71.1             | 185     | 197  | 7  | 7.5                          | 52.0      | 59.0 | 5       | 12   | 6  | 8   | 0  |  |  |  |  |
| 26 FT            | 20               | 22 | 16 | 12 | 6             | 6.5  | 7       | 7.5  | 77.1 | 44.0             | 50.0    | 6    | 12 | 55.0  | 61.0    | 6    | 12               | 38.0 | 40.0    | 7    | 7.5     | 7    | 7   | 70.8             | 186     | 198  | 7  | 7.5                          | 52.0      | 60.0 | 5       | 12   | 6  | 8   | 0  |  |  |  |  |
| 28 FT            | 21               | 23 | 17 | 12 | 6             | 6    | 7       | 7.5  | 77.1 | 45.0             | 51.0    | 6    | 12 | 54.0  | 60.0    | 6    | 12               | 37.0 | 40.0    | 7    | 6.5     | 7    | 7.5 | 70.5             | 187     | 199  | 7  | 6.5                          | 52.0      | 60.0 | 5       | 12   | 6  | 7.5 | 0  |  |  |  |  |
| 30 FT            | 22               | 25 | 18 | 12 | 6             | 6    | 7       | 7.5  | 77.3 | 46.0             | 46.0    | 7    | 15 | 59.0  | 65.0    | 7    | 15               | 42.0 | 44.0    | 7    | 7       | 6    | 6   | 67.8             | 189     | 201  | 7  | 6.5                          | 52.0      | 60.0 | 5       | 12   | 6  | 7   | 0  |  |  |  |  |
| 32 FT            | 23               | 26 | 19 | 12 | 7             | 7.5  | 7       | 7.5  | 77.5 | 47.0             | 47.0    | 7    | 15 | 58.0  | 65.0    | 7    | 15               | 41.0 | 44.0    | 7    | 7       | 6    | 6   | 67.8             | 190     | 202  | 7  | 6.5                          | 52.0      | 60.0 | 5       | 12   | 6  | 6.5 | 0  |  |  |  |  |
| 34 FT            | 24               | 27 | 19 | 12 | 7             | 7.5  | 7       | 7    | 77.6 | 48.0             | 48.0    | 7    | 14 | 58.0  | 65.0    | 7    | 14               | 41.0 | 43.0    | 7    | 7       | 6    | 6   | 67.9             | 191     | 203  | 7  | 6                            | 52.0      | 60.0 | 5       | 12   | 6  | 6.5 | 0  |  |  |  |  |
| 36 FT            | 25               | 28 | 20 | 12 | 7             | 7    | 7       | 7.5  | 78.1 | 49.0             | 49.0    | 7    | 14 | 58.0  | 64.0    | 7    | 14               | 40.0 | 42.0    | 7    | 7       | 6    | 6   | 68.1             | 192     | 204  | 7  | 6                            | 52.0      | 60.0 | 5       | 12   | 6  | 6.5 | 0  |  |  |  |  |
| 38 FT            | 26               | 29 | 21 | 12 | 7             | 7    | 7       | 7.5  | 78.6 | 50.0             | 50.0    | 7    | 13 | 58.0  | 64.0    | 7    | 13               | 40.0 | 41.0    | 7    | 6.5     | 6    | 6   | 68.3             | 193     | 205  | 7  | 6                            | 52.0      | 61.0 | 5       | 12   | 6  | 6   | 0  |  |  |  |  |
| 40 FT            | 27               | 30 | 21 | 12 | 7             | 6.5  | 7       | 7.5  | 77.1 | 51.0             | 51.0    | 7    | 13 | 57.0  | 63.0    | 7    | 13               | 39.0 | 40.0    | 7    | 6.5     | 6    | 6   | 66.5             | 194     | 206  | 7  | 6                            | 52.0      | 61.0 | 5       | 12   | 6  | 6   | 0  |  |  |  |  |
| 42 FT            | 27               | 31 | 21 | 12 | 7             | 6    | 7       | 7    | 77.0 | 51.0             | 51.0    | 7    | 12 | 57.0  | 63.0    | 7    | 12               | 40.0 | 41.0    | 7    | 6.5     | 6    | 6   | 66.8             | 195     | 207  | 7  | 6                            | 52.0      | 61.0 | 5       | 12   | 6  | 6   | 0  |  |  |  |  |
| 44 FT            | 28               | 31 | 22 | 12 | 7             | 6.5  | 7       | 7    | 77.6 | 52.0             | 58.0    | 7    | 12 | 57.0  | 63.0    | 7    | 12               | 39.0 | 40.0    | 7    | 6       | 7    | 7.5 | 69.6             | 195     | 207  | 8  | 7.5                          | 58.0      | 67.0 | 5       | 12   | 6  | 6   | 0  |  |  |  |  |
| 46 FT            | 29               | 32 | 22 | 12 | 7             | 6    | 7       | 6.5  | 77.9 | 59.0             | 59.0    | 7    | 12 | 57.0  | 62.0    | 7    | 12               | 38.0 | 40.0    | 7    | 6       | 7    | 7.5 | 70.0             | 196     | 208  | 8  | 7.5                          | 58.0      | 67.0 | 5       | 12   | 6  | 6   | 0  |  |  |  |  |
| 48 FT            | 30               | 33 | 23 | 12 | 7             | 6    | 7       | 6.5  | 78.6 | 54.0             | 60.0    | 7    | 12 | 57.0  | 62.0    | 7    | 12               | 38.0 | 39.0    | 7    | 6       | 7    | 7.5 | 70.4             | 197     | 209  | 8  | 7                            | 58.0      | 67.0 | 5       | 12   | 7  | 8   | 0  |  |  |  |  |
| 50 FT            | 30               | 34 | 24 | 12 | 7             | 6    | 7       | 6.5  | 79.1 | 54.0             | 60.0    | 7    | 12 | 57.0  | 62.0    | 7    | 12               | 38.0 | 39.0    | 7    | 6       | 7    | 7   | 70.6             | 198     | 210  | 8  | 7                            | 58.0      | 67.0 | 5       | 12   | 7  | 8   | 0  |  |  |  |  |

| SPAN (S) = 13 FT |                  |    |    |    |               |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      |                  |      |      |      |         |       |       |       |         |      |         | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|-------|------|------|---------|------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|-------|---------|------|---------|------------------------------------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |       |      |      |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |       |         |      |         |                                    | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |       |      |      | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |       | B1 BARS |      | B2 BARS |                                    |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |       | SIZE | SPA. | C5      | Q8   | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |       | SIZE    | SPA. | C7      | Q10                                | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=7' | HT=8'   | HT=9' |      |      |         |      |      |      |         |      |                  |      |      |      |         | HT=7' | HT=8' | HT=9' |         |      |         |                                    |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 9  | 8  | 8  | 5             | 6    | 5       | 8.5  | 65.8 | 34.0  | 34.0    | 34.0  | 5    | 12   | 125.5   | 92.5 | 5    | 12   | 34.0    | 38.0 | 5                | 7.5  | 6    | 6    | 60.0    | 89    | 101   | 113   | 6       | 6    | 56.0    | 59.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 10 | 8  | 8  | 6             | 8    | 5       | 8    | 65.8 | 31.0  | 35.0    | 35.0  | 6    | 16   | 129.5   | 99.5 | 6    | 16   | 40.0    | 44.0 | 5                | 7    | 6    | 6.5  | 55.5    | 90    | 102   | 114   | 6       | 6    | 54.0    | 59.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 10 | 8  | 8  | 6             | 8    | 6       | 7    | 65.8 | 31.0  | 35.0    | 35.0  | 6    | 14   | 129.5   | 99.5 | 6    | 14   | 40.0    | 44.0 | 5                | 7    | 6    | 6    | 55.5    | 90    | 102   | 114   | 7       | 6.5  | 57.0    | 62.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 10 | 8  | 8  | 6             | 8    | 6       | 7    | 56.4 | 31.0  | 35.0    | 35.0  | 6    | 14   | 77.0    | 97.0 | 6    | 14   | 38.0    | 40.0 | 5                | 7    | 6    | 6    | 49.5    | 90    | 102   | 114   | 7       | 6.5  | 57.0    | 62.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 11 | 8  | 8  | 6             | 8.5  | 6       | 7    | 49.0 | 31.0  | 31.0    | 35.0  | 6    | 13   | 63.0    | 75.0 | 6    | 13   | 35.0    | 37.0 | 5                | 6.5  | 6    | 7    | 45.9    | 91    | 103   | 115   | 7       | 7    | 55.0    | 62.0                               | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 12 | 8  | 8  | 5             | 6    | 5       | 6    | 42.0 | 32.0  | 32.0    | 32.0  | 6    | 14   | 58.0    | 67.0 | 6    | 14   | 34.0    | 36.0 | 5                | 6    | 6    | 7    | 43.3    | 92    | 104   | 116   | 7       | 7    | 54.0    | 62.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 14 | 8  | 8  | 5             | 6    | 5       | 6    | 39.8 | 33.0  | 33.0    | 33.0  | 6    | 13   | 55.0    | 63.0 | 6    | 13   | 33.0    | 36.0 | 6                | 8    | 5    | 6.5  | 38.1    | 94    | 106   | 118   | 6       | 6    | 50.0    | 59.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14               | 15 | 8  | 8  | 6             | 8    | 5       | 6    | 37.9 | 34.0  | 34.0    | 34.0  | 6    | 13   | 53.0    | 62.0 | 6    | 13   | 33.0    | 35.0 | 6                | 7.5  | 5    | 6.5  | 36.9    | 95    | 107   | 119   | 6       | 6    | 49.0    | 59.0                               | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15               | 16 | 8  | 8  | 6             | 7.5  | 5       | 6    | 41.4 | 35.0  | 35.0    | 35.0  | 6    | 12   | 58.0    | 67.0 | 6    | 12   | 39.0    | 41.0 | 6                | 7    | 5    | 6.5  | 35.9    | 96    | 108   | 120   | 6       | 6    | 49.0    | 59.0                               | 5         | 12   | 5    | 10.5 | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 16               | 17 | 8  | 8  | 6             | 7.5  | 6       | 8    | 44.4 | 36.0  | 36.0    | 36.0  | 6    | 12   | 57.0    | 67.0 | 6    | 12   | 38.0    | 41.0 | 6                | 7    | 5    | 6.5  | 35.1    | 97    | 109   | 121   | 6       | 6    | 49.0    | 60.0                               | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 17               | 18 | 8  | 8  | 6             | 7    | 6       | 7.5  | 43.5 | 37.0  | 37.0    | 37.0  | 6    | 12   | 56.0    | 66.0 | 6    | 12   | 38.0    | 41.0 | 6                | 6.5  | 5    | 6    | 34.5    | 98    | 110   | 122   | 7       | 7    | 52.0    | 63.0                               | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 18               | 20 | 9  | 8  | 6             | 6.5  | 6       | 8    | 44.3 | 38.0  | 38.0    | 38.0  | 7    | 15   | 61.0    | 71.0 | 7    | 15   | 43.0    | 46.0 | 6                | 6    | 5    | 7    | 34.6    | 100   | 112   | 124   | 6       | 6    | 49.0    | 60.0                               | 5         | 12   | 5    | 9    | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 20               | 21 | 9  | 8  | 6             | 6.5  | 6       | 8    | 43.4 | 40.0  | 40.0    | 40.0  | 6    | 12   | 55.0    | 66.0 | 6    | 12   | 38.0    | 41.0 | 7                | 8    | 5    | 6.5  | 34.5    | 101   | 113   | 125   | 7       | 7    | 52.0    | 63.0                               | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 21               | 22 | 9  | 8  | 6             | 6    | 6       | 7.5  | 43.0 | 41.0  | 41.0    | 41.0  | 7    | 15   | 60.0    | 71.0 | 7    | 15   | 43.0    | 46.0 | 7                | 7.5  | 5    | 6    | 34.3    | 102   | 114   | 126   | 7       | 7    | 51.0    | 63.0                               | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 22               | 24 | 10 | 8  | 6             | 6    | 6       | 8    | 43.8 | 42.0  | 42.0    | 42.0  | 7    | 15   | 59.0    | 70.0 | 7    | 15   | 42.0    | 46.0 | 7                | 7    | 5    | 6.5  | 34.5    | 104   | 116   | 128   | 7       | 7    | 51.0    | 63.0                               | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 23               | 25 | 11 | 8  | 7             | 7    | 5       | 6    | 40.5 | 43.0  | 43.0    | 43.0  | 7    | 14   | 59.0    | 70.0 | 7    | 14   | 42.0    | 46.0 | 7                | 6.5  | 5    | 7    | 34.9    | 105   | 117   | 129   | 7       | 6.5  | 51.0    | 63.0                               | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 25               | 26 | 11 | 8  | 7             | 7    | 5       | 6    | 40.0 | 45.0  | 45.0    | 45.0  | 7    | 14   | 59.0    | 70.0 | 7    | 14   | 41.0    | 44.0 | 7                | 6.5  | 5    | 6.5  | 34.9    | 106   | 118   | 130   | 7       | 6.5  | 51.0    | 63.0                               | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 26               | 27 | 11 | 8  | 7             | 7    | 5       | 6    | 39.8 | 46.0  | 46.0    | 46.0  | 7    | 13   | 59.0    | 69.0 | 7    | 13   | 40.0    | 43.0 | 7                | 6    | 5    | 6    | 34.8    | 107   | 119   | 131   | 7       | 6    | 51.0    | 63.0                               | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 27               | 29 | 11 | 8  | 7             | 6.5  | 6       | 8    | 43.9 | 47.0  | 47.0    | 51.0  | 7    | 13   | 58.0    | 69.0 | 7    | 13   | 40.0    | 42.0 | 7                | 6.5  | 6    | 7.5  | 37.9    | 109   | 121   | 133   | 8       | 7.5  | 57.0    | 69.0                               | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 28               | 30 | 11 | 8  | 7             | 6.5  | 6       | 7.5  | 43.9 | 52.0  | 52.0    | 52.0  | 7    | 12   | 58.0    | 68.0 | 7    | 12   | 40.0    | 42.0 | 7                | 6    | 6    | 7    | 37.9    | 110   | 122   | 134   | 8       | 7.5  | 57.0    | 69.0                               | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 29               | 31 | 11 | 8  | 7             | 6    | 6       | 6.5  | 43.9 | 53.0  | 53.0    | 53.0  | 7    | 12   | 58.0    | 68.0 | 7    | 12   | 39.0    | 41.0 | 7                | 6    | 6    | 7    | 38.0    | 111   | 123   | 135   | 8       | 7    | 57.0    | 69.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 30               | 32 | 12 | 8  | 7             | 6    | 6       | 7.5  | 44.8 | 54.0  | 54.0    | 54.0  | 7    | 12   | 58.0    | 68.0 | 7    | 12   | 38.0    | 40.0 | 7                | 6    | 6    | 7.5  | 38.5    | 112   | 124   | 136   | 8       | 7    | 57.0    | 70.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 31               | 33 | 12 | 8  | 8             | 7.5  | 6       | 7.5  | 43.8 | 55.0  | 55.0    | 55.0  | 8    | 15   | 66.0    | 75.0 | 8    | 15   | 46.0    | 47.0 | 7                | 6    | 6    | 7    | 37.6    | 113   | 125   | 137   | 8       | 7    | 57.0    | 69.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 32               | 34 | 12 | 8  | 8             | 7.5  | 6       | 7    | 43.9 | 56.0  | 56.0    | 56.0  | 8    | 14   | 65.0    | 74.0 | 8    | 14   | 45.0    | 47.0 | 7                | 6    | 6    | 7    | 37.8    | 114   | 126   | 138   | 8       | 7    | 57.0    | 69.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 32               | 35 | 12 | 8  | 8             | 7    | 6       | 7    | 43.9 | 56.0  | 56.0    | 56.0  | 8    | 14   | 65.0    | 74.0 | 8    | 14   | 46.0    | 47.0 | 7                | 6    | 6    | 6.5  | 37.8    | 115   | 127   | 139   | 8       | 7    | 57.0    | 69.0                               | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 33               | 35 | 12 | 8  | 8             | 7    | 6       | 7    | 43.9 | 57.0  | 57.0    | 57.0  | 8    | 14   | 65.0    | 74.0 | 8    | 14   | 45.0    | 47.0 | 8                | 7    | 6    | 6.5  | 37.9    | 115   | 127   | 139   | 8       | 6.5  | 57.0    | 69.0                               | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 34               | 36 | 12 | 8  | 8             | 7    | 6       | 6.5  | 43.9 | 58.0  | 58.0    | 58.0  | 8    | 14   | 65.0    | 73.0 | 8    | 14   | 45.0    | 46.0 | 8                | 7    | 6    | 6.5  | 38.1    | 116   | 128   | 140   | 8       | 6.5  | 57.0    | 69.0                               | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 13 FT |                  |    |    |    |               |      |         |      |      |        |        |        |         |      |       |       |         |      |      |      |                  |      |         |      |      |     |        |        |         | HEIGHT (HT) = 10 FT OR 11 FT OR 12 FT |      |      |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|--------|--------|--------|---------|------|-------|-------|---------|------|------|------|------------------|------|---------|------|------|-----|--------|--------|---------|---------------------------------------|------|------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |        |        |         |      |       |       |         |      |      |      | BOTTOM SLAB BARS |      |         |      |      |     |        |        |         |                                       |      |      | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |        |        |        | H1 BARS |      |       |       | H2 BARS |      |      |      | A2 BARS          |      | J4 BARS |      |      |     |        |        | H3 BARS |                                       |      |      |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |        |        | SIZE    | SPA. | C5    | Q8    | SIZE    | SPA. | C6   | Q9   | SIZE             | SPA. | SIZE    | SPA. | C4   | K3  |        |        | SIZE    | SPA.                                  | C7   | Q10  | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=10' | HT=11' | HT=12' |         |      |       |       |         |      |      |      |                  |      |         |      |      |     | HT=10' | HT=11' | HT=12'  |                                       |      |      |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 9  | 10 | 5             | 6    | 5       | 7    | 66.6 | 34.0   | 34.0   | 34.0   | 5       | 12   | 126.5 | 93.5  | 5       | 12   | 35.0 | 38.0 | 5                | 7    | 6       | 6    | 81.5 | 126 | 138    | 150    | 6       | 6.5                                   | 57.0 | 60.0 | 5         | 12   | 5    | 9    | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 10 | 10 | 10 | 6             | 8    | 5       | 7.5  | 67.3 | 35.0   | 35.0   | 35.0   | 6       | 16   | 130.5 | 100.5 | 6       | 16   | 41.0 | 44.0 | 5                | 7    | 6       | 6    | 70.1 | 126 | 138    | 150    | 6       | 6                                     | 56.0 | 58.0 | 5         | 12   | 5    | 9.5  | 12 |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 15               | 10 | 10 | 10 | 6             | 8    | 5       | 6    | 72.3 | 35.0   | 35.0   | 35.0   | 6       | 15   | 130.5 | 100.5 | 6       | 15   | 41.0 | 44.0 | 5                | 7    | 6       | 6    | 70.1 | 126 | 138    | 150    | 7       | 6.5                                   | 58.0 | 61.0 | 5         | 9.5  | 5    | 9    | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 10 | 10 | 10 | 6             | 8    | 5       | 6    | 72.3 | 31.0   | 31.0   | 31.0   | 6       | 15   | 82.0  | 97.0  | 6       | 15   | 38.0 | 39.0 | 5                | 7    | 6       | 6    | 64.6 | 126 | 138    | 150    | 7       | 6.5                                   | 58.0 | 61.0 | 5         | 9.5  | 5    | 9    | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11               | 11 | 10 | 10 | 5             | 6    | 5       | 6    | 60.5 | 31.0   | 31.0   | 31.0   | 6       | 14   | 64.0  | 71.0  | 6       | 14   | 36.0 | 37.0 | 5                | 6.5  | 6       | 6    | 61.0 | 127 | 139    | 151    | 7       | 6.5                                   | 57.0 | 61.0 | 5         | 12   | 5    | 9    | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 13 | 10 | 10 | 5             | 6    | 5       | 6    | 56.8 | 32.0   | 32.0   | 32.0   | 6       | 14   | 60.0  | 64.0  | 6       | 14   | 35.0 | 36.0 | 5                | 6    | 6       | 6.5  | 59.1 | 129 | 141    | 153    | 6       | 6                                     | 52.0 | 59.0 | 5         | 12   | 5    | 8.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 14 | 10 | 10 | 5             | 6    | 6       | 7    | 56.9 | 33.0   | 33.0   | 37.0   | 6       | 13   | 57.0  | 62.0  | 6       | 13   | 34.0 | 36.0 | 6                | 8    | 6       | 6.5  | 56.8 | 130 | 142    | 154    | 6       | 6                                     | 51.0 | 59.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14               | 15 | 10 | 10 | 5             | 6    | 6       | 6.5  | 54.6 | 34.0   | 34.0   | 38.0   | 6       | 13   | 55.0  | 61.0  | 6       | 13   | 34.0 | 36.0 | 6                | 7.5  | 6       | 6.5  | 54.9 | 131 | 143    | 155    | 6       | 6                                     | 51.0 | 59.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15               | 16 | 10 | 10 | 6             | 8    | 6       | 6.5  | 58.9 | 35.0   | 35.0   | 39.0   | 6       | 13   | 60.0  | 66.0  | 6       | 13   | 39.0 | 42.0 | 6                | 7    | 6       | 6    | 53.5 | 132 | 144    | 156    | 6       | 6                                     | 50.0 | 59.0 | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 16               | 17 | 11 | 10 | 6             | 7.5  | 6       | 7    | 58.0 | 36.0   | 36.0   | 40.0   | 6       | 12   | 58.0  | 66.0  | 6       | 12   | 39.0 | 42.0 | 6                | 7    | 6       | 7.5  | 52.5 | 133 | 145    | 157    | 6       | 6                                     | 50.0 | 59.0 | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 17               | 18 | 12 | 10 | 6             | 7.5  | 6       | 7    | 57.9 | 37.0   | 37.0   | 41.0   | 6       | 12   | 58.0  | 66.0  | 6       | 12   | 39.0 | 42.0 | 6                | 6    | 6       | 7.5  | 52.0 | 134 | 146    | 158    | 7       | 7                                     | 53.0 | 62.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 18               | 20 | 12 | 10 | 6             | 7    | 6       | 6.5  | 57.3 | 38.0   | 38.0   | 42.0   | 6       | 12   | 57.0  | 65.0  | 6       | 12   | 39.0 | 42.0 | 6                | 6    | 6       | 7.5  | 51.5 | 136 | 148    | 160    | 6       | 6                                     | 50.0 | 60.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 19               | 21 | 12 | 10 | 6             | 6    | 6       | 6.5  | 56.8 | 39.0   | 39.0   | 43.0   | 7       | 15   | 62.0  | 70.0  | 7       | 15   | 44.0 | 47.0 | 7                | 8    | 6       | 7    | 51.0 | 137 | 149    | 161    | 7       | 7                                     | 53.0 | 63.0 | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 21               | 22 | 13 | 10 | 6             | 6    | 6       | 6.5  | 56.9 | 41.0   | 41.0   | 45.0   | 6       | 12   | 56.0  | 65.0  | 6       | 12   | 38.0 | 42.0 | 7                | 7    | 6       | 7.5  | 51.1 | 138 | 150    | 162    | 7       | 7                                     | 53.0 | 63.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 22               | 24 | 13 | 10 | 6             | 6    | 6       | 6.5  | 56.6 | 42.0   | 42.0   | 46.0   | 7       | 15   | 60.0  | 70.0  | 7       | 15   | 43.0 | 46.0 | 7                | 7    | 6       | 7.5  | 50.9 | 140 | 152    | 164    | 7       | 7                                     | 53.0 | 63.0 | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 23               | 25 | 14 | 10 | 7             | 7.5  | 6       | 6.5  | 57.0 | 43.0   | 43.0   | 47.0   | 7       | 15   | 60.0  | 69.0  | 7       | 15   | 43.0 | 46.0 | 7                | 6.5  | 6       | 8    | 51.0 | 141 | 153    | 165    | 7       | 6.5                                   | 53.0 | 63.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 24               | 26 | 14 | 10 | 7             | 7    | 6       | 6.5  | 56.6 | 44.0   | 44.0   | 48.0   | 7       | 14   | 60.0  | 69.0  | 7       | 14   | 42.0 | 45.0 | 7                | 6.5  | 6       | 7.5  | 50.8 | 142 | 154    | 166    | 7       | 6.5                                   | 53.0 | 63.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 26               | 28 | 14 | 10 | 7             | 7    | 6       | 6    | 56.5 | 46.0   | 46.0   | 50.0   | 7       | 13   | 59.0  | 69.0  | 7       | 13   | 41.0 | 43.0 | 7                | 6.5  | 6       | 7.5  | 50.8 | 144 | 156    | 168    | 7       | 6                                     | 53.0 | 63.0 | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 27               | 29 | 15 | 10 | 7             | 6.5  | 6       | 6.5  | 57.1 | 51.0   | 51.0   | 51.0   | 7       | 13   | 59.0  | 68.0  | 7       | 13   | 40.0 | 43.0 | 7                | 6.5  | 6       | 8    | 51.1 | 145 | 157    | 169    | 8       | 7.5                                   | 59.0 | 70.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 28               | 30 | 15 | 10 | 7             | 6.5  | 6       | 6    | 57.1 | 52.0   | 52.0   | 52.0   | 7       | 12   | 59.0  | 68.0  | 7       | 12   | 40.0 | 42.0 | 7                | 6    | 6       | 7.5  | 51.1 | 146 | 158    | 170    | 8       | 7.5                                   | 59.0 | 70.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 29               | 31 | 16 | 10 | 7             | 6    | 6       | 6    | 57.8 | 53.0   | 53.0   | 53.0   | 7       | 12   | 59.0  | 68.0  | 7       | 12   | 39.0 | 41.0 | 7                | 6    | 6       | 7.5  | 51.6 | 147 | 159    | 171    | 8       | 7                                     | 59.0 | 70.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 30               | 32 | 16 | 10 | 7             | 6    | 6       | 6    | 57.8 | 54.0   | 54.0   | 54.0   | 7       | 12   | 59.0  | 67.0  | 7       | 12   | 39.0 | 40.0 | 7                | 6    | 6       | 7.5  | 51.6 | 148 | 160    | 172    | 8       | 7                                     | 59.0 | 70.0 | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 30               | 33 | 17 | 10 | 7             | 6    | 6       | 6    | 58.5 | 54.0   | 54.0   | 54.0   | 7       | 12   | 59.0  | 67.0  | 7       | 12   | 40.0 | 41.0 | 7                | 6    | 6       | 7    | 51.9 | 149 | 161    | 173    | 8       | 7                                     | 59.0 | 70.0 | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 31               | 34 | 17 | 10 | 8             | 7.5  | 6       | 6    | 57.4 | 55.0   | 55.0   | 55.0   | 8       | 15   | 66.0  | 74.0  | 8       | 15   | 47.0 | 48.0 | 7                | 6    | 6       | 7    | 50.8 | 150 | 162    | 174    | 8       | 7                                     | 59.0 | 70.0 | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 32               | 35 | 17 | 10 | 8             | 7.5  | 6       | 6    | 57.4 | 56.0   | 56.0   | 56.0   | 8       | 14   | 66.0  | 74.0  | 8       | 14   | 46.0 | 48.0 | 8                | 7.5  | 6       | 6.5  | 50.9 | 151 | 163    | 175    | 8       | 7                                     | 59.0 | 70.0 | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 33               | 36 | 17 | 10 | 8             | 7    | 6       | 6    | 57.4 | 57.0   | 57.0   | 57.0   | 8       | 14   | 66.0  | 73.0  | 8       | 14   | 46.0 | 47.0 | 8                | 7.5  | 6       | 6.5  | 51.1 | 152 | 164    | 176    | 8       | 6.5                                   | 59.0 | 70.0 | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 34               | 36 | 18 | 10 | 8             | 7    | 6       | 6    | 58.1 | 58.0   | 58.0   | 58.0   | 8       | 14   | 66.0  | 73.0  | 8       | 14   | 46.0 | 47.0 | 8                | 6.5  | 6       | 6.5  | 51.5 | 152 | 164    | 176    | 8       | 6.5                                   | 59.0 | 70.0 | 5         | 12   | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 13 FT |                     |    |    |    |               |      |         |      |      |        |         |      |      |       |         |      |      |      |         |      |                  |      |      |       |         |        |      |      |         |      |           | HEIGHT (HT) = 13 FT OR 14 FT |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|--------|---------|------|------|-------|---------|------|------|------|---------|------|------------------|------|------|-------|---------|--------|------|------|---------|------|-----------|------------------------------|------|------|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |         |      |      |       |         |      |      |      |         |      | BOTTOM SLAB BARS |      |      |       |         |        |      |      |         |      | WALL BARS |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |        | H1 BARS |      |      |       | H2 BARS |      |      |      | A2 BARS |      | J4 BARS          |      |      |       | H3 BARS |        |      |      | B1 BARS |      | B2 BARS   |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |         | SIZE | SPA. | C5    | Q8      | SIZE | SPA. | C6   | Q9      | SIZE | SPA.             | SIZE | SPA. | C4    | K3      |        | SIZE | SPA. | C7      | Q10  | SIZE      | SPA.                         | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=13' | HT=14'  |      |      |       |         |      |      |      |         |      |                  |      |      |       | HT=13'  | HT=14' |      |      |         |      |           |                              |      |      |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14                  | 11 | 10 | 11 | 5             | 6    | 5       | 6    | 67.5 | 34.0   | 34.0    | 5    | 12   | 127.5 | 94.5    | 5    | 12   | 35.0 | 38.0    | 5    | 7                | 6    | 6.5  | 100.1 | 163     | 175    | 5    | 6    | 56.0    | 58.0 | 5         | 12                           | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15                  | 11 | 10 | 11 | 6             | 8    | 5       | 6    | 67.5 | 35.0   | 35.0    | 6    | 16   | 131.5 | 101.5   | 6    | 16   | 41.0 | 44.0    | 5    | 6.5              | 6    | 6    | 88.9  | 163     | 175    | 6    | 6.5  | 57.0    | 60.0 | 5         | 12                           | 5    | 8    | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 15                  | 11 | 11 | 11 | 6             | 8    | 5       | 6    | 68.1 | 35.0   | 35.0    | 6    | 15   | 131.5 | 101.5   | 6    | 15   | 41.0 | 44.0    | 5    | 6.5              | 6    | 6    | 88.9  | 163     | 175    | 6    | 6    | 57.0    | 60.0 | 5         | 12                           | 5    | 7.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11                  | 11 | 11 | 11 | 6             | 8    | 5       | 6    | 68.1 | 31.0   | 31.0    | 6    | 15   | 127.5 | 92.0    | 6    | 15   | 38.0 | 39.0    | 5    | 6.5              | 6    | 6    | 78.6  | 163     | 175    | 6    | 6    | 56.0    | 60.0 | 5         | 12                           | 5    | 7.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 11                  | 12 | 11 | 11 | 5             | 6    | 6       | 7.5  | 75.9 | 31.0   | 35.0    | 6    | 14   | 65.0  | 69.0    | 6    | 14   | 36.0 | 37.0    | 5    | 6                | 6    | 6.5  | 74.6  | 164     | 176    | 6    | 6    | 54.0    | 59.0 | 5         | 12                           | 5    | 7.5  | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12                  | 13 | 11 | 11 | 5             | 6    | 6       | 7.5  | 70.1 | 32.0   | 36.0    | 6    | 14   | 61.0  | 64.0    | 6    | 14   | 35.0 | 36.0    | 5    | 6                | 6    | 6.5  | 70.9  | 165     | 177    | 6    | 6    | 53.0    | 59.0 | 5         | 12                           | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 12                  | 14 | 12 | 11 | 5             | 6    | 6       | 7.5  | 65.9 | 36.0   | 36.0    | 6    | 12   | 58.0  | 61.0    | 6    | 12   | 35.0 | 35.0    | 6    | 8                | 6    | 7    | 67.9  | 166     | 178    | 6    | 6    | 52.0    | 59.0 | 5         | 12                           | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 13                  | 15 | 12 | 11 | 6             | 8    | 6       | 7    | 64.4 | 37.0   | 37.0    | 6    | 12   | 56.0  | 60.0    | 6    | 12   | 34.0 | 35.0    | 6    | 7.5              | 6    | 7    | 66.3  | 167     | 179    | 6    | 6    | 52.0    | 59.0 | 5         | 12                           | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15                  | 16 | 12 | 11 | 6             | 8    | 6       | 6.5  | 69.9 | 39.0   | 39.0    | 6    | 13   | 60.0  | 66.0    | 6    | 13   | 40.0 | 42.0    | 6    | 7                | 6    | 6    | 64.9  | 168     | 180    | 6    | 6    | 51.0    | 59.0 | 5         | 12                           | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 16                  | 17 | 13 | 11 | 6             | 8    | 6       | 6.5  | 68.9 | 40.0   | 40.0    | 6    | 13   | 59.0  | 65.0    | 6    | 13   | 40.0 | 42.0    | 6    | 7                | 6    | 6.5  | 63.8  | 169     | 181    | 6    | 6    | 51.0    | 59.0 | 5         | 12                           | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 17                  | 19 | 14 | 11 | 6             | 7.5  | 6       | 6.5  | 68.3 | 41.0   | 41.0    | 6    | 12   | 58.0  | 65.0    | 6    | 12   | 40.0 | 42.0    | 6    | 6                | 6    | 6.5  | 63.5  | 171     | 183    | 6    | 6    | 51.0    | 60.0 | 5         | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 18                  | 20 | 14 | 11 | 6             | 7    | 6       | 6    | 67.5 | 42.0   | 42.0    | 6    | 12   | 58.0  | 65.0    | 6    | 12   | 39.0 | 42.0    | 6    | 6                | 6    | 6.5  | 62.8  | 172     | 184    | 6    | 6    | 51.0    | 60.0 | 5         | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 19                  | 21 | 14 | 11 | 6             | 6.5  | 6       | 6    | 66.9 | 43.0   | 43.0    | 6    | 12   | 57.0  | 65.0    | 6    | 12   | 39.0 | 42.0    | 7    | 8                | 6    | 6    | 62.1  | 173     | 185    | 7    | 7    | 54.0    | 63.0 | 5         | 12                           | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 20                  | 22 | 16 | 11 | 6             | 6    | 6       | 6    | 67.3 | 44.0   | 44.0    | 7    | 15   | 62.0  | 69.0    | 7    | 15   | 44.0 | 47.0    | 7    | 7                | 6    | 6.5  | 61.8  | 174     | 186    | 7    | 7    | 54.0    | 63.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 22                  | 24 | 16 | 11 | 6             | 6    | 6       | 6    | 67.1 | 46.0   | 46.0    | 7    | 15   | 61.0  | 69.0    | 7    | 15   | 43.0 | 46.0    | 7    | 7                | 6    | 7    | 61.8  | 176     | 188    | 7    | 7    | 54.0    | 63.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 23                  | 25 | 16 | 11 | 7             | 7.5  | 7       | 8    | 71.6 | 47.0   | 47.0    | 7    | 15   | 61.0  | 69.0    | 7    | 15   | 43.0 | 46.0    | 7    | 6.5              | 6    | 6.5  | 61.4  | 177     | 189    | 7    | 6.5  | 54.0    | 63.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 24                  | 26 | 16 | 11 | 7             | 7.5  | 7       | 7    | 71.3 | 48.0   | 48.0    | 7    | 14   | 60.0  | 69.0    | 7    | 14   | 42.0 | 45.0    | 7    | 6.5              | 6    | 6    | 61.0  | 178     | 190    | 7    | 6.5  | 54.0    | 63.0 | 5         | 12                           | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 25                  | 28 | 17 | 11 | 7             | 7    | 7       | 7.5  | 71.6 | 49.0   | 49.0    | 7    | 14   | 60.0  | 68.0    | 7    | 14   | 42.0 | 45.0    | 7    | 6.5              | 6    | 6.5  | 61.1  | 180     | 192    | 7    | 6    | 54.0    | 64.0 | 5         | 12                           | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 26                  | 29 | 17 | 11 | 7             | 6.5  | 7       | 6.5  | 71.4 | 50.0   | 50.0    | 7    | 13   | 60.0  | 68.0    | 7    | 13   | 42.0 | 44.0    | 7    | 6.5              | 6    | 6.5  | 61.0  | 181     | 193    | 8    | 7.5  | 60.0    | 70.0 | 5         | 12                           | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 27                  | 30 | 18 | 11 | 7             | 6.5  | 7       | 7    | 72.0 | 51.0   | 51.0    | 7    | 13   | 60.0  | 68.0    | 7    | 13   | 41.0 | 43.0    | 7    | 6                | 6    | 6.5  | 61.3  | 182     | 194    | 8    | 7.5  | 60.0    | 70.0 | 5         | 12                           | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 28                  | 31 | 19 | 11 | 7             | 6.5  | 7       | 7.5  | 72.5 | 52.0   | 52.0    | 7    | 12   | 59.0  | 67.0    | 7    | 12   | 41.0 | 43.0    | 7    | 6                | 6    | 6.5  | 61.5  | 183     | 195    | 8    | 7    | 60.0    | 70.0 | 5         | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 29                  | 32 | 19 | 11 | 7             | 6    | 7       | 6.5  | 72.6 | 53.0   | 53.0    | 7    | 12   | 59.0  | 67.0    | 7    | 12   | 40.0 | 42.0    | 7    | 6                | 6    | 6    | 61.5  | 184     | 196    | 8    | 7    | 60.0    | 70.0 | 5         | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 30                  | 33 | 20 | 11 | 7             | 6    | 7       | 7    | 73.3 | 54.0   | 54.0    | 7    | 12   | 59.0  | 66.0    | 7    | 12   | 39.0 | 41.0    | 7    | 6                | 6    | 6    | 61.9  | 185     | 197    | 8    | 7    | 60.0    | 70.0 | 5         | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 31                  | 34 | 20 | 11 | 8             | 7.5  | 7       | 7    | 71.6 | 55.0   | 55.0    | 8    | 15   | 67.0  | 73.0    | 8    | 15   | 47.0 | 48.0    | 7    | 6                | 6    | 6    | 60.1  | 186     | 198    | 8    | 7    | 60.0    | 70.0 | 5         | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 32                  | 35 | 20 | 11 | 8             | 7.5  | 7       | 6.5  | 71.6 | 56.0   | 56.0    | 8    | 15   | 67.0  | 73.0    | 8    | 15   | 46.0 | 48.0    | 8    | 7.5              | 6    | 6    | 60.3  | 187     | 199    | 8    | 7    | 60.0    | 70.0 | 5         | 12                           | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 32                  | 36 | 21 | 11 | 8             | 7    | 7       | 7    | 72.4 | 56.0   | 56.0    | 8    | 14   | 67.0  | 73.0    | 8    | 14   | 47.0 | 48.0    | 8    | 7.5              | 6    | 6    | 60.5  | 188     | 200    | 8    | 6.5  | 60.0    | 70.0 | 5         | 12                           | 6    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 33                  | 36 | 22 | 11 | 8             | 7    | 7       | 7    | 73.1 | 57.0   | 63.0    | 8    | 14   | 66.0  | 72.0    | 8    | 14   | 46.0 | 47.0    | 8    | 6.5              | 7    | 7.5  | 63.8  | 188     | 200    | 8    | 6.5  | 60.0    | 70.0 | 5         | 12                           | 6    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 13 FT |                     |      |      |      |               |                    |         |      |      |      |      |      |         |       |       |      |         |      |      |                    |                  |      |         |      |       |      |         | HEIGHT (HT) = 15 FT OR 16 FT |      |      |           |    |         |     |    |    |  |  |  |
|------------------|---------------------|------|------|------|---------------|--------------------|---------|------|------|------|------|------|---------|-------|-------|------|---------|------|------|--------------------|------------------|------|---------|------|-------|------|---------|------------------------------|------|------|-----------|----|---------|-----|----|----|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |      |      |      | TOP SLAB BARS |                    |         |      |      |      |      |      |         |       |       |      |         |      |      |                    | BOTTOM SLAB BARS |      |         |      |       |      |         |                              |      |      | WALL BARS |    |         |     |    |    |  |  |  |
|                  |                     |      |      |      | A1 BARS       |                    | J3 BARS |      |      |      |      |      | H1 BARS |       |       |      | H2 BARS |      |      |                    | A2 BARS          |      | J4 BARS |      |       |      | H3 BARS |                              |      |      | B1 BARS   |    | B2 BARS |     |    |    |  |  |  |
|                  | SIZE                | SPA. | SIZE | SPA. | C1            | K2<br>HT=15'HT=16' | SIZE    | SPA. | C5   | Q8   | SIZE | SPA. | C6      | Q9    | SIZE  | SPA. | SIZE    | SPA. | C4   | K3<br>HT=15'HT=16' | SIZE             | SPA. | C7      | Q10  | SIZE  | SPA. | SIZE    | SPA.                         | G1   |      |           |    |         |     |    |    |  |  |  |
|                  | 1 FT                | 14   | 11   | 12   | 13            | 5                  | 6       | 5    | 6    | 69.0 | 34.0 | 34.0 | 5       | 12    | 128.5 | 95.5 | 5       | 12   | 35.0 | 37.0               | 5                | 6.5  | 6       | 6.5  | 103.3 | 187  | 199     | 6                            | 7    | 60.0 | 61.0      | 5  | 10.5    | 5   | 7  | 12 |  |  |  |
| 2 FT             | 15                  | 11   | 12   | 13   | 6             | 8                  | 6       | 8    | 72.0 | 35.0 | 39.0 | 6    | 16      | 135.5 | 102.5 | 6    | 16      | 41.0 | 44.0 | 5                  | 6.5              | 6    | 6       | 95.4 | 187   | 199  | 6       | 6.5                          | 58.0 | 59.0 | 5         | 12 | 5       | 7   | 12 |    |  |  |  |
| 2'- 4'           | 15                  | 11   | 12   | 13   | 6             | 8                  | 6       | 7    | 72.0 | 35.0 | 39.0 | 6    | 15      | 135.5 | 102.5 | 6    | 15      | 41.0 | 44.0 | 5                  | 6.5              | 7    | 6       | 95.4 | 187   | 199  | 6       | 6                            | 58.0 | 59.0 | 5         | 12 | 5       | 6.5 | 12 |    |  |  |  |
| 4 FT             | 11                  | 11   | 12   | 13   | 6             | 8                  | 6       | 7    | 72.0 | 35.0 | 35.0 | 6    | 15      | 130.5 | 82.0  | 6    | 15      | 39.0 | 39.0 | 5                  | 6.5              | 7    | 6       | 92.5 | 187   | 199  | 6       | 6                            | 57.0 | 59.0 | 5         | 12 | 5       | 6.5 | 12 |    |  |  |  |
| 6 FT             | 11                  | 12   | 12   | 13   | 5             | 6                  | 6       | 6.5  | 90.4 | 35.0 | 35.0 | 6    | 14      | 65.0  | 66.0  | 6    | 14      | 37.0 | 37.0 | 5                  | 6                | 7    | 6       | 88.9 | 188   | 200  | 6       | 6                            | 56.0 | 59.0 | 5         | 12 | 5       | 6.5 | 12 |    |  |  |  |
| 8 FT             | 11                  | 13   | 13   | 13   | 5             | 6                  | 6       | 6.5  | 78.1 | 35.0 | 35.0 | 6    | 13      | 60.0  | 62.0  | 6    | 13      | 36.0 | 36.0 | 5                  | 6                | 6    | 6       | 82.4 | 189   | 201  | 6       | 6                            | 55.0 | 59.0 | 5         | 12 | 5       | 6.5 | 0  |    |  |  |  |
| 10 FT            | 12                  | 14   | 13   | 13   | 5             | 6                  | 6       | 6.5  | 76.0 | 36.0 | 36.0 | 6    | 13      | 58.0  | 60.0  | 6    | 13      | 35.0 | 36.0 | 6                  | 8                | 6    | 6       | 80.4 | 190   | 202  | 6       | 6                            | 54.0 | 59.0 | 5         | 12 | 5       | 6   | 0  |    |  |  |  |
| 12 FT            | 13                  | 15   | 14   | 13   | 5             | 6                  | 6       | 6.5  | 73.3 | 37.0 | 37.0 | 6    | 12      | 57.0  | 59.0  | 6    | 12      | 35.0 | 36.0 | 6                  | 7.5              | 6    | 6       | 77.5 | 191   | 203  | 6       | 6                            | 53.0 | 59.0 | 5         | 12 | 5       | 6   | 0  |    |  |  |  |
| 14 FT            | 14                  | 16   | 14   | 13   | 6             | 8                  | 6       | 6    | 72.3 | 38.0 | 38.0 | 6    | 12      | 55.0  | 59.0  | 6    | 12      | 35.0 | 36.0 | 6                  | 7                | 6    | 6       | 76.3 | 192   | 204  | 7       | 7                            | 55.0 | 62.0 | 5         | 12 | 5       | 6   | 0  |    |  |  |  |
| 16 FT            | 15                  | 17   | 16   | 13   | 6             | 7.5                | 6       | 6.5  | 76.6 | 39.0 | 39.0 | 6    | 12      | 60.0  | 64.0  | 6    | 12      | 41.0 | 42.0 | 6                  | 6.5              | 6    | 6.5     | 73.3 | 193   | 205  | 7       | 7                            | 55.0 | 62.0 | 5         | 12 | 6       | 8   | 0  |    |  |  |  |
| 18 FT            | 16                  | 19   | 16   | 13   | 6             | 7                  | 6       | 6    | 76.3 | 40.0 | 40.0 | 6    | 12      | 59.0  | 64.0  | 6    | 12      | 40.0 | 42.0 | 6                  | 6                | 6    | 6       | 74.1 | 195   | 207  | 6       | 6                            | 52.0 | 60.0 | 5         | 12 | 6       | 8   | 0  |    |  |  |  |
| 20 FT            | 18                  | 20   | 16   | 13   | 6             | 7                  | 6       | 6    | 76.8 | 42.0 | 42.0 | 6    | 12      | 59.0  | 64.0  | 6    | 12      | 40.0 | 42.0 | 6                  | 6                | 6    | 6       | 73.0 | 196   | 208  | 6       | 6                            | 52.0 | 60.0 | 5         | 12 | 6       | 8   | 0  |    |  |  |  |
| 22 FT            | 19                  | 21   | 17   | 13   | 6             | 6.5                | 6       | 6    | 76.4 | 43.0 | 43.0 | 6    | 12      | 58.0  | 64.0  | 6    | 12      | 40.0 | 42.0 | 7                  | 7.5              | 7    | 7.5     | 75.1 | 197   | 209  | 7       | 7                            | 55.0 | 63.0 | 5         | 12 | 6       | 7.5 | 0  |    |  |  |  |
| 24 FT            | 20                  | 23   | 17   | 13   | 6             | 6.5                | 7       | 7.5  | 81.1 | 44.0 | 50.0 | 6    | 12      | 58.0  | 64.0  | 6    | 12      | 40.0 | 42.0 | 7                  | 7                | 7    | 7       | 75.4 | 199   | 211  | 7       | 7                            | 55.0 | 63.0 | 5         | 12 | 6       | 7.5 | 0  |    |  |  |  |
| 26 FT            | 22                  | 24   | 18   | 13   | 6             | 6                  | 7       | 7.5  | 81.5 | 46.0 | 52.0 | 7    | 15      | 62.0  | 69.0  | 7    | 15      | 44.0 | 46.0 | 7                  | 7                | 7    | 7.5     | 74.9 | 200   | 212  | 7       | 7                            | 55.0 | 63.0 | 5         | 12 | 6       | 7   | 0  |    |  |  |  |
| 28 FT            | 23                  | 25   | 18   | 13   | 7             | 7.5                | 7       | 6.5  | 81.3 | 47.0 | 53.0 | 7    | 15      | 62.0  | 69.0  | 7    | 15      | 43.0 | 46.0 | 7                  | 6.5              | 7    | 6.5     | 74.6 | 201   | 213  | 7       | 6.5                          | 55.0 | 63.0 | 5         | 12 | 6       | 7   | 0  |    |  |  |  |
| 30 FT            | 24                  | 26   | 19   | 13   | 7             | 7.5                | 7       | 7    | 81.3 | 48.0 | 54.0 | 7    | 14      | 61.0  | 69.0  | 7    | 14      | 43.0 | 46.0 | 7                  | 6.5              | 7    | 7       | 74.4 | 202   | 214  | 7       | 6.5                          | 55.0 | 63.0 | 5         | 12 | 6       | 6.5 | 0  |    |  |  |  |
| 32 FT            | 25                  | 28   | 20   | 13   | 7             | 7                  | 7       | 7    | 81.4 | 49.0 | 55.0 | 7    | 14      | 61.0  | 68.0  | 7    | 14      | 42.0 | 45.0 | 7                  | 6.5              | 7    | 7.5     | 74.6 | 204   | 216  | 7       | 6                            | 55.0 | 64.0 | 5         | 12 | 6       | 6.5 | 0  |    |  |  |  |
| 34 FT            | 26                  | 29   | 21   | 13   | 7             | 7                  | 7       | 7    | 81.6 | 50.0 | 56.0 | 7    | 13      | 61.0  | 68.0  | 7    | 13      | 42.0 | 44.0 | 7                  | 6.5              | 7    | 7.5     | 74.5 | 205   | 217  | 8       | 7.5                          | 61.0 | 70.0 | 5         | 12 | 6       | 6   | 0  |    |  |  |  |
| 36 FT            | 27                  | 30   | 22   | 13   | 7             | 6.5                | 7       | 7    | 82.0 | 57.0 | 57.0 | 7    | 13      | 60.0  | 68.0  | 7    | 13      | 42.0 | 44.0 | 7                  | 6                | 7    | 7.5     | 74.8 | 206   | 218  | 8       | 7.5                          | 61.0 | 70.0 | 5         | 12 | 6       | 6   | 0  |    |  |  |  |
| 38 FT            | 28                  | 31   | 22   | 13   | 7             | 6.5                | 7       | 6.5  | 82.1 | 58.0 | 58.0 | 7    | 12      | 60.0  | 67.0  | 7    | 12      | 41.0 | 43.0 | 7                  | 6                | 7    | 7       | 74.8 | 207   | 219  | 8       | 7                            | 61.0 | 70.0 | 5         | 12 | 6       | 6   | 0  |    |  |  |  |
| 40 FT            | 29                  | 32   | 23   | 13   | 7             | 6                  | 7       | 6.5  | 82.6 | 59.0 | 59.0 | 7    | 12      | 60.0  | 67.0  | 7    | 12      | 41.0 | 42.0 | 7                  | 6                | 7    | 7       | 75.0 | 208   | 220  | 8       | 7                            | 61.0 | 70.0 | 5         | 12 | 7       | 7.5 | 0  |    |  |  |  |
| 42 FT            | 30                  | 33   | 24   | 13   | 7             | 6                  | 7       | 6.5  | 83.3 | 60.0 | 60.0 | 7    | 12      | 60.0  | 66.0  | 7    | 12      | 40.0 | 42.0 | 7                  | 6                | 7    | 7       | 75.3 | 209   | 221  | 8       | 7                            | 61.0 | 70.0 | 5         | 12 | 7       | 7.5 | 0  |    |  |  |  |
| 44 FT            | 31                  | 34   | 24   | 13   | 7             | 6                  | 7       | 7    | 81.8 | 61.0 | 61.0 | 8    | 15      | 68.0  | 74.0  | 8    | 15      | 47.0 | 49.0 | 7                  | 6                | 7    | 7       | 73.5 | 210   | 222  | 8       | 7                            | 61.0 | 70.0 | 5         | 12 | 7       | 7.5 | 0  |    |  |  |  |
| 46 FT            | 31                  | 35   | 24   | 13   | 8             | 7.5                | 7       | 6    | 81.6 | 61.0 | 61.0 | 8    | 15      | 68.0  | 74.0  | 8    | 15      | 48.0 | 49.0 | 8                  | 7.5              | 7    | 7       | 73.8 | 211   | 223  | 8       | 7                            | 61.0 | 70.0 | 5         | 12 | 7       | 7.5 | 0  |    |  |  |  |
| 48 FT            | 32                  | 36   | 25   | 13   | 8             | 7.5                | 7       | 6    | 82.4 | 62.0 | 62.0 | 8    | 14      | 67.0  | 73.0  | 8    | 14      | 47.0 | 49.0 | 8                  | 7.5              | 7    | 7       | 74.1 | 212   | 224  | 8       | 6.5                          | 61.0 | 71.0 | 5         | 12 | 7       | 7.5 | 0  |    |  |  |  |
| 50 FT            | 33                  | 37   | 26   | 13   | 8             | 7                  | 7       | 6    | 83.1 | 63.0 | 63.0 | 8    | 14      | 67.0  | 72.0  | 8    | 14      | 47.0 | 48.0 | 8                  | 7.5              | 7    | 6.5     | 74.5 | 213   | 225  | 8       | 6.5                          | 61.0 | 71.0 | 5         | 12 | 7       | 7.5 | 0  |    |  |  |  |



| SPAN (S) = 14 FT |                  |    |    |    |               |      |         |      |      |       |       |       |         |      |       |       |         |      |      |      |                  |      |         |      |      |       |       |       |         |      |      | HEIGHT (HT) = 7 FT OR 8 FT OR 9 FT |           |      |         |      |     |   |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|-------|-------|---------|------|-------|-------|---------|------|------|------|------------------|------|---------|------|------|-------|-------|-------|---------|------|------|------------------------------------|-----------|------|---------|------|-----|---|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |       |       |         |      |       |       |         |      |      |      | BOTTOM SLAB BARS |      |         |      |      |       |       |       |         |      |      |                                    | WALL BARS |      |         |      |     |   |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       |       |       | H1 BARS |      |       |       | H2 BARS |      |      |      | A2 BARS          |      | J4 BARS |      |      |       |       |       | H3 BARS |      |      |                                    | B1 BARS   |      | B2 BARS |      |     |   |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |       |       | SIZE    | SPA. | C5    | Q8    | SIZE    | SPA. | C6   | Q9   | SIZE             | SPA. | SIZE    | SPA. | C4   | K3    |       |       | SIZE    | SPA. | C7   | Q10                                | SIZE      | SPA. | SIZE    | SPA. | G1  |   |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=7' | HT=8' | HT=9' |         |      |       |       |         |      |      |      |                  |      |         |      |      | HT=7' | HT=8' | HT=9' |         |      |      |                                    |           |      |         |      |     |   |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 8  | 8  | 6             | 8.5  | 5       | 8.5  | 69.3 | 34.0  | 34.0  | 34.0  | 5       | 12   | 133.5 | 98.5  | 5       | 12   | 39.0 | 43.0 | 5                | 7    | 6       | 7    | 60.9 | 90    | 102   | 114   | 6       | 6.5  | 58.0 | 63.0                               | 5         | 12   | 5       | 12   | 12  |   |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 10 | 8  | 8  | 6             | 8    | 5       | 8    | 69.3 | 35.0  | 35.0  | 35.0  | 6       | 16   | 137.5 | 105.5 | 6       | 16   | 45.0 | 49.0 | 5                | 7    | 6       | 6    | 54.8 | 90    | 102   | 114   | 7       | 7    | 60.0 | 64.0                               | 5         | 12   | 5       | 12   | 12  |   |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 11 | 8  | 8  | 6             | 7.5  | 5       | 6    | 69.3 | 35.0  | 35.0  | 35.0  | 6       | 14   | 137.5 | 105.5 | 6       | 14   | 45.0 | 49.0 | 5                | 6.5  | 6       | 6    | 54.8 | 91    | 103   | 115   | 6       | 6    | 60.0 | 64.0                               | 5         | 12   | 5       | 12   | 12  |   |  |  |  |  |  |  |  |  |  |
| 4 FT             | 12               | 11 | 8  | 8  | 6             | 7.5  | 5       | 6    | 52.4 | 32.0  | 32.0  | 32.0  | 6       | 14   | 80.0  | 103.0 | 6       | 14   | 39.0 | 42.0 | 5                | 6.5  | 6       | 7    | 49.1 | 91    | 103   | 115   | 6       | 6    | 56.0 | 62.0                               | 5         | 12   | 5       | 12   | 12  |   |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12               | 12 | 8  | 8  | 6             | 8    | 6       | 7.5  | 48.9 | 32.0  | 32.0  | 32.0  | 6       | 13   | 66.0  | 81.0  | 6       | 13   | 37.0 | 39.0 | 5                | 6    | 5       | 6    | 42.1 | 92    | 104   | 116   | 7       | 7    | 57.0 | 65.0                               | 5         | 12   | 5       | 12   | 12  |   |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 13 | 8  | 8  | 6             | 7.5  | 6       | 7    | 45.5 | 32.0  | 32.0  | 32.0  | 6       | 12   | 61.0  | 69.0  | 6       | 12   | 35.0 | 37.0 | 6                | 8.5  | 5       | 6    | 39.1 | 93    | 105   | 117   | 7       | 7    | 56.0 | 66.0                               | 5         | 12   | 5       | 12   | 0   |   |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 14 | 9  | 8  | 6             | 7    | 5       | 6    | 41.3 | 33.0  | 33.0  | 33.0  | 7       | 15   | 61.0  | 69.0  | 7       | 15   | 38.0 | 40.0 | 6                | 8    | 5       | 7    | 38.4 | 94    | 106   | 118   | 7       | 6.5  | 55.0 | 65.0                               | 5         | 12   | 5       | 12   | 0   |   |  |  |  |  |  |  |  |  |  |
| 12 FT            | 15               | 16 | 9  | 8  | 6             | 7.5  | 5       | 6.5  | 43.5 | 35.0  | 35.0  | 35.0  | 6       | 12   | 62.0  | 71.0  | 6       | 12   | 40.0 | 43.0 | 6                | 7    | 5       | 8    | 36.8 | 96    | 108   | 120   | 6       | 6    | 52.0 | 63.0                               | 5         | 12   | 5       | 12   | 0   |   |  |  |  |  |  |  |  |  |  |
| 14 FT            | 16               | 17 | 9  | 8  | 6             | 7    | 5       | 6    | 41.9 | 36.0  | 36.0  | 36.0  | 6       | 12   | 61.0  | 70.0  | 6       | 12   | 40.0 | 43.0 | 6                | 7    | 5       | 7.5  | 35.8 | 97    | 109   | 121   | 7       | 7    | 54.0 | 66.0                               | 5         | 12   | 5       | 12   | 0   |   |  |  |  |  |  |  |  |  |  |
| 16 FT            | 17               | 18 | 9  | 8  | 6             | 7    | 5       | 6    | 40.8 | 37.0  | 37.0  | 37.0  | 7       | 15   | 65.0  | 75.0  | 7       | 15   | 44.0 | 48.0 | 6                | 6.5  | 5       | 7    | 34.9 | 98    | 110   | 122   | 7       | 7    | 54.0 | 66.0                               | 5         | 12   | 5       | 12   | 0   |   |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18               | 20 | 9  | 8  | 6             | 6.5  | 6       | 8    | 44.0 | 38.0  | 38.0  | 38.0  | 7       | 15   | 64.0  | 75.0  | 7       | 15   | 44.0 | 47.0 | 6                | 6    | 5       | 7    | 34.0 | 100   | 112   | 124   | 7       | 7    | 54.0 | 66.0                               | 5         | 12   | 5       | 10   | 0   |   |  |  |  |  |  |  |  |  |  |
| 20 FT            | 20               | 21 | 9  | 8  | 6             | 6.5  | 5       | 6    | 38.9 | 40.0  | 40.0  | 40.0  | 7       | 15   | 63.0  | 75.0  | 7       | 15   | 44.0 | 48.0 | 7                | 8    | 5       | 6.5  | 33.9 | 101   | 113   | 125   | 7       | 7    | 54.0 | 66.0                               | 5         | 12   | 5       | 9    | 0   |   |  |  |  |  |  |  |  |  |  |
| 22 FT            | 21               | 22 | 9  | 8  | 6             | 6    | 6       | 8    | 42.4 | 41.0  | 41.0  | 41.0  | 7       | 14   | 63.0  | 74.0  | 7       | 14   | 44.0 | 47.0 | 7                | 7    | 5       | 6    | 33.5 | 102   | 114   | 126   | 7       | 6.5  | 54.0 | 66.0                               | 5         | 12   | 5       | 8.5  | 0   |   |  |  |  |  |  |  |  |  |  |
| 24 FT            | 23               | 24 | 9  | 8  | 7             | 7.5  | 6       | 7    | 42.0 | 47.0  | 47.0  | 47.0  | 7       | 15   | 62.0  | 74.0  | 7       | 15   | 44.0 | 47.0 | 7                | 7    | 6       | 7    | 36.4 | 104   | 116   | 128   | 7       | 7    | 54.0 | 66.0                               | 5         | 12   | 5       | 8.5  | 0   |   |  |  |  |  |  |  |  |  |  |
| 26 FT            | 24               | 25 | 9  | 8  | 7             | 7.5  | 6       | 7    | 41.6 | 48.0  | 48.0  | 48.0  | 7       | 14   | 62.0  | 74.0  | 7       | 14   | 43.0 | 47.0 | 7                | 6.5  | 6       | 7    | 36.1 | 105   | 117   | 129   | 7       | 6.5  | 54.0 | 66.0                               | 5         | 12   | 5       | 8.5  | 0   |   |  |  |  |  |  |  |  |  |  |
| 28 FT            | 25               | 26 | 9  | 8  | 7             | 7    | 6       | 6    | 41.4 | 49.0  | 49.0  | 49.0  | 7       | 14   | 61.0  | 73.0  | 7       | 14   | 43.0 | 47.0 | 7                | 6    | 6       | 6.5  | 35.9 | 106   | 118   | 130   | 7       | 6    | 54.0 | 66.0                               | 5         | 12   | 5       | 7.5  | 0   |   |  |  |  |  |  |  |  |  |  |
| 30 FT            | 27               | 28 | 10 | 8  | 7             | 6.5  | 6       | 7    | 42.3 | 51.0  | 51.0  | 51.0  | 7       | 13   | 61.0  | 73.0  | 7       | 13   | 42.0 | 45.0 | 7                | 6    | 6       | 7    | 36.5 | 108   | 120   | 132   | 7       | 6    | 54.0 | 67.0                               | 5         | 12   | 5       | 8    | 0   |   |  |  |  |  |  |  |  |  |  |
| 32 FT            | 28               | 29 | 10 | 8  | 7             | 6.5  | 6       | 6.5  | 42.0 | 52.0  | 52.0  | 52.0  | 7       | 12   | 61.0  | 73.0  | 7       | 12   | 41.0 | 44.0 | 7                | 6    | 6       | 6.5  | 36.4 | 109   | 121   | 133   | 8       | 7.5  | 60.0 | 73.0                               | 5         | 12   | 5       | 7.5  | 0   |   |  |  |  |  |  |  |  |  |  |
| 34 FT            | 29               | 30 | 10 | 8  | 7             | 6    | 6       | 6    | 41.9 | 53.0  | 53.0  | 53.0  | 7       | 12   | 61.0  | 72.0  | 7       | 12   | 41.0 | 44.0 | 8                | 7    | 6       | 6    | 6.5  | 36.4  | 110   | 122   | 134     | 8    | 7    | 60.0                               | 73.0      | 5    | 12      | 5    | 7   | 0 |  |  |  |  |  |  |  |  |  |
| 36 FT            | 30               | 32 | 11 | 8  | 7             | 6    | 6       | 7    | 42.9 | 54.0  | 54.0  | 54.0  | 7       | 12   | 61.0  | 72.0  | 7       | 12   | 41.0 | 43.0 | 7                | 6    | 6       | 6    | 6.5  | 36.9  | 112   | 124   | 136     | 8    | 7    | 60.0                               | 73.0      | 5    | 12      | 5    | 7.5 | 0 |  |  |  |  |  |  |  |  |  |
| 38 FT            | 31               | 33 | 11 | 8  | 8             | 7.5  | 6       | 6.5  | 42.9 | 55.0  | 55.0  | 55.0  | 8       | 15   | 68.0  | 79.0  | 8       | 15   | 48.0 | 51.0 | 8                | 7.5  | 6       | 6.5  | 37.0 | 113   | 125   | 137   | 8       | 6.5  | 60.0 | 73.0                               | 5         | 12   | 5       | 7    | 0   |   |  |  |  |  |  |  |  |  |  |
| 40 FT            | 32               | 34 | 11 | 8  | 8             | 7.5  | 6       | 6.5  | 42.9 | 56.0  | 56.0  | 56.0  | 8       | 14   | 68.0  | 79.0  | 8       | 14   | 48.0 | 50.0 | 8                | 7.5  | 6       | 6    | 37.1 | 114   | 126   | 138   | 8       | 6.5  | 60.0 | 73.0                               | 5         | 12   | 5       | 6.5  | 0   |   |  |  |  |  |  |  |  |  |  |
| 42 FT            | 33               | 35 | 12 | 8  | 8             | 7    | 6       | 7    | 43.8 | 57.0  | 57.0  | 57.0  | 8       | 14   | 68.0  | 78.0  | 8       | 14   | 47.0 | 49.0 | 8                | 7    | 6       | 6    | 6.5  | 37.6  | 115   | 127   | 139     | 8    | 6.5  | 60.0                               | 73.0      | 5    | 12      | 5    | 7   | 0 |  |  |  |  |  |  |  |  |  |
| 44 FT            | 34               | 36 | 12 | 8  | 8             | 7    | 6       | 6.5  | 43.8 | 58.0  | 58.0  | 58.0  | 8       | 14   | 68.0  | 78.0  | 8       | 14   | 47.0 | 48.0 | 8                | 7    | 6       | 6    | 6.5  | 37.8  | 116   | 128   | 140     | 8    | 6    | 60.0                               | 73.0      | 5    | 12      | 5    | 6.5 | 0 |  |  |  |  |  |  |  |  |  |
| 46 FT            | 35               | 37 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 42.9 | 59.0  | 59.0  | 59.0  | 8       | 13   | 67.0  | 77.0  | 8       | 13   | 46.0 | 47.0 | 8                | 7    | 6       | 6    | 6.5  | 37.0  | 117   | 129   | 141     | 8    | 6    | 60.0                               | 73.0      | 5    | 12      | 5    | 6.5 | 0 |  |  |  |  |  |  |  |  |  |
| 48 FT            | 36               | 38 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 43.0 | 60.0  | 60.0  | 60.0  | 8       | 13   | 67.0  | 76.0  | 8       | 13   | 46.0 | 47.0 | 8                | 7    | 6       | 6    | 6    | 37.1  | 118   | 130   | 142     | 8    | 6    | 60.0                               | 73.0      | 5    | 12      | 5    | 6   | 0 |  |  |  |  |  |  |  |  |  |
| 50 FT            | 37               | 39 | 12 | 8  | 8             | 6.5  | 6       | 6    | 43.1 | 61.0  | 61.0  | 61.0  | 8       | 13   | 67.0  | 75.0  | 8       | 13   | 46.0 | 47.0 | 8                | 7    | 6       | 6    | 6    | 37.4  | 119   | 131   | 143     | 8    | 6    | 60.0                               | 73.0      | 5    | 12      | 5    | 6   | 0 |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 14 FT |                  |    |    |    |               |      |         |      |      |        |        |        |         |      |       |       |         |      |      |      |                  |      |         |      |      |     |        |        |         | HEIGHT (HT) = 10 FT OR 11 FT OR 12 FT |      |      |           |      |         |      |    |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|--------|--------|--------|---------|------|-------|-------|---------|------|------|------|------------------|------|---------|------|------|-----|--------|--------|---------|---------------------------------------|------|------|-----------|------|---------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |        |        |         |      |       |       |         |      |      |      | BOTTOM SLAB BARS |      |         |      |      |     |        |        |         |                                       |      |      | WALL BARS |      |         |      |    |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |        |        |        | H1 BARS |      |       |       | H2 BARS |      |      |      | A2 BARS          |      | J4 BARS |      |      |     |        |        | H3 BARS |                                       |      |      | B1 BARS   |      | B2 BARS |      |    |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | T1 | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |        |        | SIZE    | SPA. | C5    | Q8    | SIZE    | SPA. | C6   | Q9   | SIZE             | SPA. | SIZE    | SPA. | C4   | K3  |        |        | SIZE    | SPA.                                  | C7   | Q10  | SIZE      | SPA. | SIZE    | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=10' | HT=11' | HT=12' |         |      |       |       |         |      |      |      |                  |      |         |      |      |     | HT=10' | HT=11' | HT=12'  |                                       |      |      |           |      |         |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 9  | 10 | 6             | 8.5  | 5       | 7    | 70.3 | 34.0   | 34.0   | 34.0   | 5       | 12   | 134.5 | 99.5  | 5       | 12   | 39.0 | 43.0 | 5                | 7    | 6       | 6    | 80.1 | 126 | 138    | 150    | 6       | 6                                     | 60.0 | 63.0 | 5         | 10.5 | 5       | 9    | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 11 | 9  | 10 | 6             | 8    | 5       | 7    | 70.3 | 35.0   | 35.0   | 35.0   | 6       | 16   | 138.5 | 106.5 | 6       | 16   | 45.0 | 48.0 | 5                | 6.5  | 6       | 6    | 73.6 | 127 | 139    | 151    | 6       | 6.5                                   | 59.0 | 62.0 | 5         | 12   | 5       | 9    | 12 |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 15               | 11 | 11 | 10 | 6             | 7    | 5       | 6    | 70.3 | 35.0   | 35.0   | 35.0   | 6       | 13   | 138.5 | 106.5 | 6       | 13   | 45.0 | 48.0 | 5                | 6.5  | 6       | 6    | 73.6 | 127 | 139    | 151    | 7       | 7                                     | 61.0 | 65.0 | 5         | 9.5  | 5       | 9    | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 11 | 11 | 10 | 6             | 7    | 5       | 6    | 66.6 | 31.0   | 31.0   | 31.0   | 6       | 13   | 81.0  | 94.0  | 6       | 13   | 39.0 | 40.0 | 5                | 6.5  | 5       | 6    | 61.8 | 127 | 139    | 151    | 7       | 7                                     | 61.0 | 65.0 | 5         | 9.5  | 5       | 10   | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12               | 12 | 11 | 10 | 6             | 8    | 5       | 6.5  | 60.6 | 32.0   | 32.0   | 32.0   | 6       | 13   | 67.0  | 75.0  | 6       | 13   | 37.0 | 39.0 | 5                | 6    | 5       | 6    | 57.3 | 128 | 140    | 152    | 7       | 7                                     | 59.0 | 65.0 | 5         | 12   | 5       | 10.5 | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 13 | 11 | 10 | 6             | 8    | 5       | 6    | 56.3 | 32.0   | 32.0   | 32.0   | 6       | 12   | 62.0  | 67.0  | 6       | 12   | 36.0 | 37.0 | 5                | 6    | 6       | 7    | 57.4 | 129 | 141    | 153    | 7       | 6.5                                   | 57.0 | 65.0 | 5         | 12   | 5       | 10   | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 14 | 11 | 10 | 6             | 7.5  | 6       | 8    | 56.3 | 33.0   | 33.0   | 37.0   | 6       | 12   | 59.0  | 65.0  | 6       | 12   | 35.0 | 37.0 | 6                | 7.5  | 6       | 7    | 55.0 | 130 | 142    | 154    | 7       | 6.5                                   | 57.0 | 65.0 | 5         | 12   | 5       | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14               | 16 | 12 | 10 | 6             | 7.5  | 6       | 8    | 54.9 | 34.0   | 34.0   | 34.0   | 7       | 15   | 61.0  | 67.0  | 7       | 15   | 38.0 | 39.0 | 6                | 7    | 5       | 6    | 50.9 | 132 | 144    | 156    | 7       | 7                                     | 56.0 | 66.0 | 5         | 12   | 5       | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 16               | 17 | 12 | 10 | 6             | 7.5  | 6       | 8    | 59.3 | 36.0   | 36.0   | 36.0   | 6       | 12   | 62.0  | 70.0  | 6       | 12   | 41.0 | 43.0 | 6                | 7    | 5       | 6    | 49.9 | 133 | 145    | 157    | 7       | 7                                     | 56.0 | 66.0 | 5         | 12   | 5       | 9    | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 17               | 18 | 12 | 10 | 6             | 7    | 6       | 7.5  | 58.1 | 37.0   | 37.0   | 41.0   | 7       | 16   | 66.0  | 74.0  | 7       | 16   | 45.0 | 48.0 | 6                | 6.5  | 6       | 8    | 52.0 | 134 | 146    | 158    | 7       | 7                                     | 56.0 | 66.0 | 5         | 12   | 5       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18               | 20 | 12 | 10 | 6             | 7    | 6       | 7    | 57.5 | 38.0   | 38.0   | 42.0   | 7       | 15   | 65.0  | 74.0  | 7       | 15   | 45.0 | 48.0 | 6                | 6    | 6       | 8    | 51.3 | 136 | 148    | 160    | 7       | 7                                     | 55.0 | 66.0 | 5         | 12   | 5       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 19               | 21 | 12 | 10 | 6             | 6    | 6       | 6.5  | 56.6 | 39.0   | 39.0   | 43.0   | 7       | 14   | 64.0  | 74.0  | 7       | 14   | 45.0 | 48.0 | 7                | 8    | 6       | 7.5  | 50.6 | 137 | 149    | 161    | 7       | 7                                     | 55.0 | 66.0 | 5         | 12   | 5       | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 21               | 22 | 12 | 10 | 6             | 6    | 6       | 6.5  | 55.9 | 41.0   | 41.0   | 45.0   | 7       | 15   | 64.0  | 74.0  | 7       | 15   | 45.0 | 48.0 | 7                | 7    | 6       | 6.5  | 50.3 | 138 | 150    | 162    | 7       | 7                                     | 55.0 | 66.0 | 5         | 12   | 5       | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 22               | 24 | 13 | 10 | 6             | 6    | 6       | 6.5  | 56.4 | 42.0   | 42.0   | 46.0   | 7       | 14   | 63.0  | 73.0  | 7       | 14   | 44.0 | 48.0 | 7                | 7    | 6       | 7.5  | 50.4 | 140 | 152    | 164    | 7       | 7                                     | 55.0 | 67.0 | 5         | 12   | 5       | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 23               | 25 | 14 | 10 | 7             | 7    | 6       | 6.5  | 56.6 | 43.0   | 43.0   | 47.0   | 7       | 14   | 63.0  | 73.0  | 7       | 14   | 44.0 | 48.0 | 7                | 6.5  | 6       | 8    | 50.4 | 141 | 153    | 165    | 7       | 6.5                                   | 55.0 | 67.0 | 5         | 12   | 5       | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 25               | 27 | 14 | 10 | 7             | 7    | 6       | 6.5  | 56.4 | 45.0   | 45.0   | 49.0   | 7       | 14   | 62.0  | 73.0  | 7       | 14   | 43.0 | 47.0 | 7                | 6.5  | 6       | 8    | 50.3 | 143 | 155    | 167    | 7       | 6                                     | 55.0 | 67.0 | 5         | 12   | 5       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 26               | 28 | 14 | 10 | 7             | 7    | 6       | 6.5  | 56.0 | 46.0   | 46.0   | 50.0   | 7       | 13   | 62.0  | 73.0  | 7       | 13   | 43.0 | 47.0 | 7                | 6    | 6       | 7.5  | 50.0 | 144 | 156    | 168    | 7       | 6                                     | 55.0 | 67.0 | 5         | 12   | 5       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 27               | 29 | 14 | 10 | 7             | 6    | 6       | 6    | 55.6 | 51.0   | 51.0   | 51.0   | 7       | 12   | 62.0  | 72.0  | 7       | 12   | 43.0 | 46.0 | 7                | 6    | 6       | 7.5  | 49.8 | 145 | 157    | 169    | 8       | 7.5                                   | 61.0 | 73.0 | 5         | 12   | 5       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 29               | 31 | 15 | 10 | 7             | 6    | 6       | 6.5  | 56.3 | 53.0   | 53.0   | 53.0   | 7       | 12   | 61.0  | 72.0  | 7       | 12   | 41.0 | 44.0 | 7                | 6    | 6       | 7.5  | 50.3 | 147 | 159    | 171    | 8       | 7                                     | 61.0 | 73.0 | 5         | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 30               | 32 | 15 | 10 | 7             | 6    | 6       | 6    | 56.1 | 54.0   | 54.0   | 54.0   | 7       | 12   | 61.0  | 71.0  | 7       | 12   | 41.0 | 43.0 | 8                | 7.5  | 6       | 7.5  | 50.3 | 148 | 160    | 172    | 8       | 7                                     | 61.0 | 73.0 | 5         | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 31               | 33 | 16 | 10 | 8             | 7.5  | 6       | 6    | 56.9 | 55.0   | 55.0   | 55.0   | 8       | 15   | 69.0  | 79.0  | 8       | 15   | 49.0 | 51.0 | 8                | 7.5  | 6       | 7    | 50.6 | 149 | 161    | 173    | 8       | 6.5                                   | 61.0 | 73.0 | 5         | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 32               | 34 | 16 | 10 | 8             | 7.5  | 6       | 6    | 56.9 | 56.0   | 56.0   | 56.0   | 8       | 14   | 69.0  | 78.0  | 8       | 14   | 48.0 | 50.0 | 8                | 7    | 6       | 7    | 50.6 | 150 | 162    | 174    | 8       | 6.5                                   | 61.0 | 73.0 | 5         | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 33               | 35 | 16 | 10 | 8             | 7    | 6       | 6    | 56.9 | 57.0   | 57.0   | 57.0   | 8       | 14   | 69.0  | 78.0  | 8       | 14   | 48.0 | 49.0 | 8                | 7    | 6       | 6    | 50.8 | 151 | 163    | 175    | 8       | 6.5                                   | 61.0 | 73.0 | 5         | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 34               | 36 | 17 | 10 | 8             | 7    | 6       | 6    | 57.6 | 58.0   | 58.0   | 58.0   | 8       | 14   | 68.0  | 77.0  | 8       | 14   | 47.0 | 49.0 | 8                | 7    | 6       | 6.5  | 51.3 | 152 | 164    | 176    | 8       | 6                                     | 61.0 | 73.0 | 5         | 12   | 6       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 35               | 37 | 17 | 10 | 8             | 6.5  | 6       | 6    | 56.5 | 59.0   | 59.0   | 59.0   | 8       | 13   | 68.0  | 77.0  | 8       | 13   | 47.0 | 48.0 | 8                | 7    | 6       | 6.5  | 50.1 | 153 | 165    | 177    | 8       | 6                                     | 61.0 | 73.0 | 5         | 12   | 6       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 35               | 38 | 17 | 10 | 8             | 6.5  | 6       | 6    | 56.5 | 59.0   | 59.0   | 59.0   | 8       | 13   | 68.0  | 77.0  | 8       | 13   | 47.0 | 49.0 | 8                | 7    | 6       | 6    | 50.1 | 154 | 166    | 178    | 8       | 6                                     | 61.0 | 73.0 | 5         | 12   | 6       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 36               | 39 | 17 | 10 | 8             | 6.5  | 7       | 7.5  | 61.6 | 60.0   | 60.0   | 60.0   | 8       | 13   | 68.0  | 76.0  | 8       | 13   | 47.0 | 48.0 | 8                | 6.5  | 6       | 6    | 50.3 | 155 | 167    | 179    | 8       | 6                                     | 61.0 | 73.0 | 5         | 12   | 6       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 14 FT |                  |    |    |    |               |      |         |      |      |                        |         |      |    |       |         |      |    |      |         |      |                  |      |     |                        |         |      |    |     |         |      |           | HEIGHT (HT) = 13 FT OR 14 FT |    |     |    |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|------------------------|---------|------|----|-------|---------|------|----|------|---------|------|------------------|------|-----|------------------------|---------|------|----|-----|---------|------|-----------|------------------------------|----|-----|----|--|--|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                        |         |      |    |       |         |      |    |      |         |      | BOTTOM SLAB BARS |      |     |                        |         |      |    |     |         |      | WALL BARS |                              |    |     |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                        | H1 BARS |      |    |       | H2 BARS |      |    |      | A2 BARS |      | J4 BARS          |      |     |                        | H3 BARS |      |    |     | B1 BARS |      | B2 BARS   |                              |    |     |    |  |  |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2<br>HT=13'<br>HT=14' | SIZE    | SPA. | C5 | Q8    | SIZE    | SPA. | C6 | Q9   | SIZE    | SPA. | SIZE             | SPA. | C4  | K3<br>HT=13'<br>HT=14' | SIZE    | SPA. | C7 | Q10 | SIZE    | SPA. | SIZE      | SPA.                         | G1 |     |    |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 10 | 11 | 11 | 5             | 6    | 5       | 6.5  | 71.8 | 34.0                   | 34.0    | 5    | 12 | 135.5 | 100.5   | 5    | 12 | 39.0 | 42.0    | 5    | 7                | 6    | 6   | 87.3                   | 162     | 174  | 6  | 6   | 60.0    | 62.0 | 5         | 12                           | 5  | 7.5 | 2  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 11 | 11 | 11 | 6             | 8    | 5       | 6.5  | 71.8 | 35.0                   | 35.0    | 6    | 16 | 139.5 | 107.5   | 6    | 16 | 45.0 | 48.0    | 5    | 6.5              | 6    | 6.5 | 83.4                   | 163     | 175  | 6  | 6   | 59.0    | 62.0 | 5         | 12                           | 5  | 7.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 15               | 11 | 11 | 11 | 6             | 6.5  | 6       | 7    | 88.0 | 35.0                   | 35.0    | 6    | 13 | 139.5 | 107.5   | 6    | 13 | 45.0 | 48.0    | 5    | 6.5              | 6    | 6   | 83.4                   | 163     | 175  | 7  | 6.5 | 62.0    | 66.0 | 5         | 10.5                         | 5  | 7.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 11               | 11 | 11 | 11 | 6             | 6.5  | 6       | 7    | 88.0 | 31.0                   | 35.0    | 6    | 13 | 86.0  | 92.0    | 6    | 13 | 40.0 | 40.0    | 5    | 6.5              | 6    | 6   | 76.4                   | 163     | 175  | 7  | 6.5 | 62.0    | 66.0 | 5         | 10.5                         | 5  | 7.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12               | 12 | 11 | 11 | 6             | 8    | 6       | 7.5  | 74.5 | 32.0                   | 36.0    | 6    | 13 | 68.0  | 75.0    | 6    | 13 | 38.0 | 39.0    | 5    | 6                | 6    | 6   | 71.3                   | 164     | 176  | 7  | 6.5 | 60.0    | 65.0 | 5         | 12                           | 5  | 7.5 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 13 | 11 | 11 | 6             | 8    | 6       | 7    | 68.5 | 36.0                   | 36.0    | 6    | 12 | 63.0  | 67.0    | 6    | 12 | 36.0 | 37.0    | 6    | 8                | 6    | 6.5 | 68.8                   | 165     | 177  | 7  | 6.5 | 58.0    | 65.0 | 5         | 12                           | 5  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 15 | 11 | 11 | 6             | 7.5  | 6       | 6.5  | 66.0 | 37.0                   | 37.0    | 6    | 12 | 60.0  | 65.0    | 6    | 12 | 36.0 | 37.0    | 6    | 7.5              | 6    | 6   | 67.4                   | 167     | 179  | 6  | 6   | 55.0    | 63.0 | 5         | 12                           | 5  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14               | 16 | 12 | 11 | 6             | 7.5  | 6       | 6.5  | 64.0 | 38.0                   | 38.0    | 7    | 16 | 61.0  | 67.0    | 7    | 16 | 38.0 | 40.0    | 6    | 7                | 6    | 7   | 65.3                   | 168     | 180  | 7  | 7   | 57.0    | 66.0 | 5         | 12                           | 5  | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 16               | 17 | 13 | 11 | 6             | 7.5  | 6       | 7    | 69.1 | 40.0                   | 40.0    | 6    | 12 | 63.0  | 69.0    | 6    | 12 | 41.0 | 43.0    | 6    | 7                | 6    | 6.5 | 63.6                   | 169     | 181  | 7  | 7   | 57.0    | 65.0 | 5         | 12                           | 5  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 17               | 18 | 13 | 11 | 6             | 7    | 6       | 6.5  | 67.8 | 41.0                   | 41.0    | 6    | 12 | 62.0  | 69.0    | 6    | 12 | 41.0 | 43.0    | 6    | 6                | 6    | 6.5 | 62.4                   | 170     | 182  | 7  | 6.5 | 56.0    | 66.0 | 5         | 12                           | 5  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18               | 20 | 13 | 11 | 6             | 7    | 6       | 6    | 66.6 | 42.0                   | 42.0    | 7    | 15 | 66.0  | 74.0    | 7    | 15 | 46.0 | 48.0    | 6    | 6                | 6    | 6   | 61.9                   | 172     | 184  | 7  | 7   | 56.0    | 66.0 | 5         | 12                           | 5  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 19               | 21 | 14 | 11 | 6             | 6.5  | 6       | 6    | 66.3 | 43.0                   | 43.0    | 7    | 15 | 65.0  | 73.0    | 7    | 15 | 45.0 | 48.0    | 7    | 8                | 6    | 6.5 | 61.0                   | 173     | 185  | 7  | 7   | 56.0    | 66.0 | 5         | 12                           | 5  | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 21               | 23 | 14 | 11 | 6             | 6    | 7       | 8    | 70.6 | 45.0                   | 45.0    | 7    | 15 | 64.0  | 73.0    | 7    | 15 | 45.0 | 48.0    | 7    | 7                | 6    | 6   | 60.8                   | 175     | 187  | 7  | 7   | 56.0    | 66.0 | 5         | 12                           | 5  | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 22               | 24 | 15 | 11 | 6             | 6    | 7       | 8    | 70.5 | 46.0                   | 46.0    | 7    | 15 | 64.0  | 73.0    | 7    | 15 | 45.0 | 48.0    | 7    | 7                | 6    | 6.5 | 60.3                   | 176     | 188  | 7  | 7   | 56.0    | 66.0 | 5         | 12                           | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 23               | 25 | 15 | 11 | 7             | 7.5  | 7       | 7.5  | 69.9 | 47.0                   | 47.0    | 7    | 14 | 64.0  | 73.0    | 7    | 14 | 45.0 | 48.0    | 7    | 6.5              | 6    | 6   | 59.6                   | 177     | 189  | 7  | 6.5 | 56.0    | 67.0 | 5         | 12                           | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 25               | 27 | 16 | 11 | 7             | 7    | 7       | 7.5  | 70.3 | 49.0                   | 49.0    | 7    | 14 | 63.0  | 72.0    | 7    | 14 | 44.0 | 47.0    | 7    | 6.5              | 6    | 6.5 | 59.9                   | 179     | 191  | 7  | 6   | 56.0    | 67.0 | 5         | 12                           | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 26               | 28 | 16 | 11 | 7             | 7    | 7       | 7    | 69.8 | 50.0                   | 50.0    | 7    | 13 | 62.0  | 72.0    | 7    | 13 | 43.0 | 46.0    | 7    | 6                | 6    | 6   | 59.4                   | 180     | 192  | 7  | 6   | 56.0    | 67.0 | 5         | 12                           | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 27               | 30 | 17 | 11 | 7             | 6.5  | 7       | 7.5  | 70.1 | 51.0                   | 51.0    | 7    | 13 | 62.0  | 72.0    | 7    | 13 | 43.0 | 46.0    | 7    | 6                | 6    | 6.5 | 59.5                   | 182     | 194  | 8  | 7.5 | 62.0    | 73.0 | 5         | 12                           | 6  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 28               | 31 | 17 | 11 | 7             | 6    | 7       | 6.5  | 69.8 | 52.0                   | 52.0    | 7    | 12 | 62.0  | 71.0    | 7    | 12 | 43.0 | 45.0    | 7    | 6                | 6    | 6.5 | 59.1                   | 183     | 195  | 8  | 7   | 62.0    | 73.0 | 5         | 12                           | 6  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 29               | 32 | 18 | 11 | 7             | 6    | 7       | 7    | 70.3 | 53.0                   | 53.0    | 7    | 12 | 62.0  | 71.0    | 7    | 12 | 42.0 | 45.0    | 8    | 7.5              | 6    | 6.5 | 59.3                   | 184     | 196  | 8  | 7   | 62.0    | 73.0 | 5         | 12                           | 6  | 7   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 31               | 33 | 19 | 11 | 8             | 7.5  | 7       | 7.5  | 71.0 | 55.0                   | 55.0    | 8    | 15 | 70.0  | 78.0    | 8    | 15 | 48.0 | 50.0    | 8    | 7.5              | 6    | 6.5 | 59.6                   | 185     | 197  | 8  | 6.5 | 62.0    | 73.0 | 5         | 12                           | 6  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 31               | 34 | 19 | 11 | 8             | 7    | 7       | 6.5  | 70.9 | 55.0                   | 55.0    | 8    | 14 | 70.0  | 78.0    | 8    | 14 | 49.0 | 51.0    | 8    | 7                | 6    | 6.5 | 59.5                   | 186     | 198  | 8  | 6.5 | 62.0    | 73.0 | 5         | 12                           | 6  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 32               | 35 | 20 | 11 | 8             | 7    | 7       | 7    | 71.5 | 56.0                   | 56.0    | 8    | 14 | 69.0  | 77.0    | 8    | 14 | 49.0 | 51.0    | 8    | 7                | 6    | 6   | 59.8                   | 187     | 199  | 8  | 6.5 | 62.0    | 74.0 | 5         | 12                           | 6  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 33               | 36 | 20 | 11 | 8             | 7    | 7       | 6.5  | 71.5 | 57.0                   | 57.0    | 8    | 14 | 69.0  | 77.0    | 8    | 14 | 48.0 | 50.0    | 8    | 7                | 6    | 6   | 59.9                   | 188     | 200  | 8  | 6   | 62.0    | 74.0 | 5         | 12                           | 6  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 34               | 37 | 20 | 11 | 8             | 7    | 7       | 7    | 70.1 | 58.0                   | 58.0    | 8    | 14 | 69.0  | 76.0    | 8    | 14 | 47.0 | 49.0    | 8    | 7                | 6    | 6   | 58.5                   | 189     | 201  | 8  | 6   | 62.0    | 74.0 | 5         | 12                           | 6  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 35               | 38 | 21 | 11 | 8             | 6.5  | 7       | 7    | 70.9 | 59.0                   | 59.0    | 8    | 13 | 68.0  | 75.0    | 8    | 13 | 47.0 | 48.0    | 8    | 7                | 6    | 6   | 59.0                   | 190     | 202  | 8  | 6   | 62.0    | 74.0 | 5         | 12                           | 6  | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 36               | 39 | 21 | 11 | 8             | 6.5  | 7       | 6.5  | 70.9 | 60.0                   | 60.0    | 8    | 13 | 68.0  | 75.0    | 8    | 13 | 47.0 | 48.0    | 8    | 6.5              | 6    | 6   | 59.1                   | 191     | 203  | 8  | 6   | 62.0    | 74.0 | 5         | 12                           | 6  | 6   | 0  |  |  |  |  |  |  |  |  |  |  |  |  |

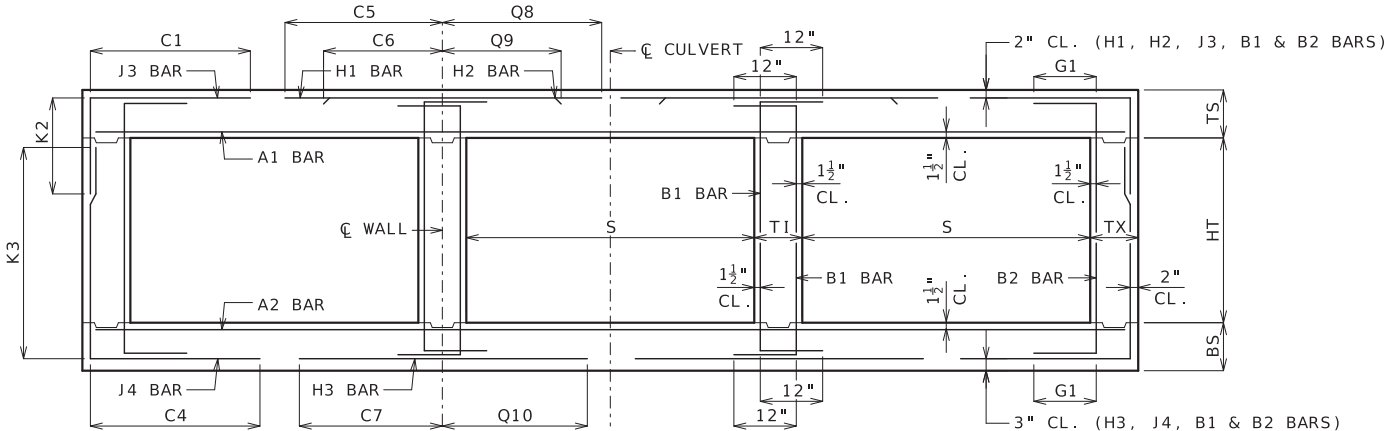
| SPAN (S) = 14 FT |                  |    |    |    |               |      |         |      |      |                  |         |      |    |       |         |      |                  |      |         |      |         |      |     |                  |         |      |    |     |           | HEIGHT (HT) = 15 FT OR 16 FT |         |      |    |     |    |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|------------------|---------|------|----|-------|---------|------|------------------|------|---------|------|---------|------|-----|------------------|---------|------|----|-----|-----------|------------------------------|---------|------|----|-----|----|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |                  |         |      |    |       |         |      | BOTTOM SLAB BARS |      |         |      |         |      |     |                  |         |      |    |     | WALL BARS |                              |         |      |    |     |    |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |                  | H1 BARS |      |    |       | H2 BARS |      |                  |      | A2 BARS |      | J4 BARS |      |     |                  | H3 BARS |      |    |     | B1 BARS   |                              | B2 BARS |      |    |     |    |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2               | SIZE    | SPA. | C5 | Q8    | SIZE    | SPA. | C6               | Q9   | SIZE    | SPA. | SIZE    | SPA. | C4  | K3               | SIZE    | SPA. | C7 | Q10 | SIZE      | SPA.                         | SIZE    | SPA. | G1 |     |    |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=15'<br>HT=16' |         |      |    |       |         |      |                  |      |         |      |         |      |     | HT=15'<br>HT=16' |         |      |    |     |           |                              |         |      |    |     |    |  |  |  |  |  |  |  |  |  |
| 1 FT             | 14               | 11 | 12 | 13 | 5             | 6    | 5       | 6    | 72.6 | 34.0             | 34.0    | 5    | 12 | 136.5 | 101.5   | 5    | 12               | 38.0 | 41.0    | 5    | 6.5     | 6    | 6   | 103.4            | 187     | 199  | 6  | 6.5 | 62.0      | 63.0                         | 5       | 11.5 | 5  | 7   | 12 |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12 | 12 | 13 | 6             | 8    | 6       | 8    | 75.6 | 35.0             | 39.0    | 6    | 16 | 143.5 | 108.5   | 6    | 16               | 45.0 | 48.0    | 5    | 6       | 6    | 6.5 | 99.0             | 188     | 200  | 6  | 6.5 | 61.0      | 63.0                         | 5       | 12   | 5  | 7   | 12 |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 15               | 12 | 12 | 13 | 6             | 8    | 6       | 7.5  | 75.6 | 36.0             | 39.0    | 6    | 15 | 143.5 | 108.5   | 6    | 15               | 45.0 | 48.0    | 5    | 6       | 6    | 6   | 99.0             | 188     | 200  | 6  | 6   | 61.0      | 63.0                         | 5       | 12   | 5  | 7   | 12 |  |  |  |  |  |  |  |  |  |
| 4 FT             | 12               | 12 | 12 | 13 | 6             | 8    | 6       | 7.5  | 75.6 | 36.0             | 36.0    | 6    | 15 | 138.5 | 89.0    | 6    | 15               | 40.0 | 41.0    | 5    | 6       | 6    | 6   | 90.1             | 188     | 200  | 6  | 6   | 60.0      | 63.0                         | 5       | 12   | 5  | 7   | 12 |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12               | 13 | 12 | 13 | 6             | 8    | 6       | 7    | 89.3 | 36.0             | 36.0    | 6    | 14 | 69.0  | 71.0    | 6    | 14               | 38.0 | 39.0    | 5    | 6       | 6    | 6   | 86.4             | 189     | 201  | 6  | 6   | 58.0      | 63.0                         | 5       | 12   | 5  | 6.5 | 12 |  |  |  |  |  |  |  |  |  |
| 8 FT             | 12               | 14 | 13 | 13 | 6             | 8    | 6       | 6.5  | 78.1 | 36.0             | 36.0    | 6    | 12 | 64.0  | 66.0    | 6    | 12               | 37.0 | 37.0    | 6    | 8       | 6    | 6   | 81.9             | 190     | 202  | 6  | 6   | 57.0      | 62.0                         | 5       | 12   | 5  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 13               | 15 | 13 | 13 | 6             | 8    | 6       | 6.5  | 75.1 | 37.0             | 37.0    | 6    | 12 | 61.0  | 64.0    | 6    | 12               | 37.0 | 37.0    | 6    | 7.5     | 6    | 6.5 | 79.1             | 191     | 203  | 7  | 7   | 59.0      | 65.0                         | 5       | 12   | 5  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 14               | 16 | 14 | 13 | 6             | 7.5  | 6       | 6.5  | 72.9 | 38.0             | 38.0    | 6    | 12 | 59.0  | 63.0    | 6    | 12               | 36.0 | 37.0    | 6    | 7       | 6    | 6.5 | 75.6             | 192     | 204  | 7  | 7   | 58.0      | 65.0                         | 5       | 12   | 5  | 6   | 0  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 15               | 17 | 15 | 13 | 6             | 7.5  | 6       | 6.5  | 77.6 | 39.0             | 39.0    | 7    | 16 | 69.0  | 73.0    | 7    | 16               | 47.0 | 48.0    | 6    | 7       | 6    | 6.5 | 73.6             | 193     | 205  | 7  | 7   | 58.0      | 65.0                         | 5       | 12   | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 17               | 19 | 15 | 13 | 6             | 7.5  | 6       | 6    | 77.6 | 41.0             | 41.0    | 6    | 12 | 63.0  | 68.0    | 6    | 12               | 42.0 | 44.0    | 6    | 6       | 6    | 6   | 73.5             | 195     | 207  | 6  | 6   | 55.0      | 63.0                         | 5       | 12   | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 18               | 20 | 15 | 13 | 6             | 7    | 7       | 7.5  | 81.8 | 42.0             | 48.0    | 7    | 16 | 67.0  | 73.0    | 7    | 16               | 46.0 | 49.0    | 6    | 6       | 7    | 7   | 75.6             | 196     | 208  | 7  | 7   | 57.0      | 66.0                         | 5       | 12   | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 19               | 21 | 16 | 13 | 6             | 6.5  | 7       | 7.5  | 81.1 | 43.0             | 49.0    | 7    | 15 | 66.0  | 73.0    | 7    | 15               | 46.0 | 49.0    | 7    | 7.5     | 7    | 7.5 | 74.8             | 197     | 209  | 7  | 7   | 57.0      | 66.0                         | 5       | 12   | 6  | 8   | 0  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 20               | 23 | 17 | 13 | 6             | 6    | 7       | 7.5  | 80.8 | 44.0             | 50.0    | 7    | 15 | 65.0  | 73.0    | 7    | 15               | 46.0 | 49.0    | 7    | 7       | 7    | 7.5 | 74.6             | 199     | 211  | 7  | 7   | 57.0      | 66.0                         | 5       | 12   | 6  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 22               | 24 | 17 | 13 | 6             | 6    | 7       | 7    | 80.8 | 46.0             | 52.0    | 7    | 15 | 65.0  | 73.0    | 7    | 15               | 46.0 | 49.0    | 7    | 7       | 7    | 7   | 74.1             | 200     | 212  | 7  | 7   | 57.0      | 66.0                         | 5       | 12   | 6  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 23               | 25 | 18 | 13 | 7             | 7.5  | 7       | 7    | 80.5 | 47.0             | 53.0    | 7    | 15 | 65.0  | 72.0    | 7    | 15               | 46.0 | 49.0    | 7    | 6       | 7    | 7.5 | 73.6             | 201     | 213  | 7  | 6   | 57.0      | 67.0                         | 5       | 12   | 6  | 7   | 0  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 24               | 27 | 19 | 13 | 7             | 7.5  | 7       | 7    | 80.5 | 48.0             | 54.0    | 7    | 14 | 64.0  | 72.0    | 7    | 14               | 45.0 | 48.0    | 7    | 6.5     | 7    | 8   | 73.8             | 203     | 215  | 7  | 6   | 57.0      | 67.0                         | 5       | 12   | 6  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 25               | 28 | 20 | 13 | 7             | 6.5  | 7       | 7    | 80.6 | 49.0             | 55.0    | 7    | 13 | 64.0  | 72.0    | 7    | 13               | 45.0 | 48.0    | 7    | 6       | 7    | 8   | 73.5             | 204     | 216  | 7  | 6   | 57.0      | 67.0                         | 5       | 12   | 6  | 6.5 | 0  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 27               | 30 | 21 | 13 | 7             | 6.5  | 7       | 7    | 81.1 | 51.0             | 51.0    | 7    | 13 | 63.0  | 71.0    | 7    | 13               | 43.0 | 46.0    | 7    | 6       | 6    | 6   | 70.8             | 206     | 218  | 8  | 7.5 | 63.0      | 73.0                         | 5       | 12   | 6  | 6   | 0  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 28               | 31 | 21 | 13 | 7             | 6.5  | 7       | 7    | 80.9 | 52.0             | 52.0    | 7    | 12 | 63.0  | 71.0    | 7    | 12               | 43.0 | 46.0    | 7    | 6       | 6    | 6   | 70.4             | 207     | 219  | 8  | 7   | 63.0      | 73.0                         | 5       | 12   | 6  | 6   | 0  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 29               | 32 | 22 | 13 | 7             | 6    | 7       | 7    | 81.1 | 59.0             | 59.0    | 7    | 12 | 63.0  | 71.0    | 7    | 12               | 43.0 | 45.0    | 8    | 7.5     | 7    | 7.5 | 73.3             | 208     | 220  | 8  | 7   | 63.0      | 73.0                         | 5       | 12   | 6  | 6   | 0  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 30               | 33 | 22 | 13 | 7             | 6    | 7       | 6    | 81.1 | 60.0             | 60.0    | 7    | 12 | 63.0  | 71.0    | 7    | 12               | 42.0 | 45.0    | 8    | 7.5     | 7    | 7   | 73.4             | 209     | 221  | 8  | 6.5 | 63.0      | 74.0                         | 5       | 12   | 6  | 6   | 0  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 31               | 34 | 23 | 13 | 8             | 7.5  | 7       | 6.5  | 81.8 | 61.0             | 61.0    | 8    | 15 | 70.0  | 78.0    | 8    | 15               | 50.0 | 52.0    | 8    | 7       | 7    | 7.5 | 73.5             | 210     | 222  | 8  | 6.5 | 63.0      | 74.0                         | 5       | 12   | 7  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 32               | 35 | 24 | 13 | 8             | 7.5  | 7       | 6.5  | 82.3 | 62.0             | 62.0    | 8    | 14 | 70.0  | 78.0    | 8    | 14               | 49.0 | 51.0    | 8    | 6.5     | 7    | 7   | 73.8             | 211     | 223  | 8  | 6.5 | 63.0      | 74.0                         | 5       | 12   | 7  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 33               | 36 | 24 | 13 | 8             | 7    | 7       | 6    | 82.4 | 63.0             | 63.0    | 8    | 14 | 70.0  | 77.0    | 8    | 14               | 49.0 | 50.0    | 8    | 6.5     | 7    | 7   | 73.9             | 212     | 224  | 8  | 6   | 63.0      | 74.0                         | 5       | 12   | 7  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 34               | 38 | 26 | 13 | 8             | 7    | 7       | 6    | 83.8 | 64.0             | 64.0    | 8    | 14 | 70.0  | 76.0    | 8    | 14               | 48.0 | 49.0    | 8    | 7       | 7    | 7   | 74.6             | 214     | 226  | 8  | 6.5 | 63.0      | 74.0                         | 5       | 12   | 7  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 35               | 38 | 26 | 13 | 8             | 6.5  | 7       | 6.5  | 82.1 | 65.0             | 65.0    | 8    | 13 | 69.0  | 76.0    | 8    | 13               | 48.0 | 49.0    | 8    | 6.5     | 7    | 7   | 72.6             | 214     | 226  | 8  | 6   | 63.0      | 74.0                         | 5       | 12   | 7  | 8   | 0  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 35               | 39 | 26 | 13 | 8             | 6.5  | 7       | 6    | 82.1 | 65.0             | 65.0    | 8    | 13 | 69.0  | 76.0    | 8    | 13               | 48.0 | 50.0    | 8    | 6.5     | 7    | 6.5 | 72.8             | 215     | 227  | 8  | 6   | 63.0      | 74.0                         | 5       | 12   | 7  | 7.5 | 0  |  |  |  |  |  |  |  |  |  |





| SPAN (S) = 15 FT |                  |    |    |    |               |      |         |      |       |        |        |        |         |      |       |       |         |      |      |      |                  |      |         |      |      |        |        |        |         |      |      |      | HEIGHT (HT) = 14 FT OR 15 FT OR 16 FT |      |         |      |    |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|-------|--------|--------|--------|---------|------|-------|-------|---------|------|------|------|------------------|------|---------|------|------|--------|--------|--------|---------|------|------|------|---------------------------------------|------|---------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |       |        |        |        |         |      |       |       |         |      |      |      | BOTTOM SLAB BARS |      |         |      |      |        |        |        |         |      |      |      | WALL BARS                             |      |         |      |    |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |       |        |        |        | H1 BARS |      |       |       | H2 BARS |      |      |      | A2 BARS          |      | J4 BARS |      |      |        |        |        | H3 BARS |      |      |      | B1 BARS                               |      | B2 BARS |      |    |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1    | K2     |        |        | SIZE    | SPA. | C5    | Q8    | SIZE    | SPA. | C6   | Q9   | SIZE             | SPA. | SIZE    | SPA. | C4   | K3     |        |        | SIZE    | SPA. | C7   | Q10  | SIZE                                  | SPA. | SIZE    | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |       | HT=14' | HT=15' | HT=16' |         |      |       |       |         |      |      |      |                  |      |         |      |      | HT=14' | HT=15' | HT=16' |         |      |      |      |                                       |      |         |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15               | 11 | 12 | 13 | 6             | 8    | 6       | 8    | 79.3  | 35.0   | 35.0   | 39.0   | 6       | 16   | 152.5 | 114.5 | 6       | 16   | 48.0 | 51.0 | 5                | 6.5  | 6       | 6    | 99.0 | 175    | 187    | 199    | 6       | 6    | 64.0 | 65.0 | 5                                     | 11.5 | 5       | 7    | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 15               | 12 | 12 | 13 | 6             | 8    | 6       | 8    | 79.3  | 35.0   | 35.0   | 39.0   | 6       | 16   | 152.5 | 114.5 | 6       | 16   | 49.0 | 52.0 | 5                | 6    | 6       | 6.5  | 95.5 | 176    | 188    | 200    | 6       | 6    | 63.0 | 66.0 | 5                                     | 11.5 | 5       | 7    | 12 |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 15               | 12 | 12 | 13 | 6             | 7    | 6       | 7    | 111.5 | 36.0   | 36.0   | 39.0   | 6       | 13   | 152.5 | 114.5 | 6       | 13   | 49.0 | 52.0 | 5                | 6    | 6       | 6    | 95.5 | 176    | 188    | 200    | 7       | 6.5  | 65.0 | 69.0 | 5                                     | 9.5  | 5       | 7    | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 12               | 12 | 12 | 13 | 6             | 7    | 6       | 7    | 111.5 | 36.0   | 36.0   | 36.0   | 6       | 13   | 99.0  | 91.0  | 6       | 13   | 41.0 | 42.0 | 5                | 6    | 6       | 6    | 88.6 | 176    | 188    | 200    | 7       | 6.5  | 65.0 | 69.0 | 5                                     | 9.5  | 5       | 7    | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 12               | 13 | 12 | 13 | 6             | 7.5  | 6       | 6.5  | 85.6  | 36.0   | 36.0   | 36.0   | 6       | 12   | 71.0  | 73.0  | 6       | 12   | 40.0 | 40.0 | 6                | 8    | 6       | 6    | 84.0 | 177    | 189    | 201    | 7       | 6.5  | 64.0 | 69.0 | 5                                     | 12   | 5       | 6.5  | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 13               | 14 | 13 | 13 | 6             | 7.5  | 6       | 7    | 77.4  | 37.0   | 37.0   | 37.0   | 6       | 12   | 67.0  | 70.0  | 6       | 12   | 38.0 | 39.0 | 6                | 7.5  | 6       | 6    | 78.1 | 178    | 190    | 202    | 7       | 6.5  | 62.0 | 68.0 | 5                                     | 12   | 5       | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 14               | 16 | 13 | 13 | 6             | 7.5  | 6       | 6    | 75.0  | 38.0   | 38.0   | 38.0   | 7       | 15   | 67.0  | 71.0  | 7       | 15   | 41.0 | 42.0 | 6                | 7    | 6       | 6    | 77.0 | 180    | 192    | 204    | 7       | 7    | 61.0 | 69.0 | 5                                     | 12   | 5       | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 15               | 17 | 14 | 13 | 6             | 7    | 6       | 6    | 78.9  | 39.0   | 39.0   | 39.0   | 7       | 15   | 73.0  | 78.0  | 7       | 15   | 48.0 | 50.0 | 6                | 7    | 6       | 6.5  | 74.8 | 181    | 193    | 205    | 7       | 6.5  | 60.0 | 69.0 | 5                                     | 12   | 5       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 16               | 18 | 15 | 13 | 6             | 7    | 6       | 6    | 77.5  | 40.0   | 40.0   | 40.0   | 7       | 14   | 71.0  | 77.0  | 7       | 14   | 48.0 | 49.0 | 6                | 6.5  | 6       | 6.5  | 73.0 | 182    | 194    | 206    | 7       | 6.5  | 60.0 | 69.0 | 5                                     | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 18               | 20 | 15 | 13 | 6             | 7    | 7       | 8    | 81.9  | 42.0   | 42.0   | 42.0   | 7       | 15   | 70.0  | 77.0  | 7       | 15   | 48.0 | 50.0 | 6                | 6    | 6       | 6    | 72.4 | 184    | 196    | 208    | 7       | 7    | 60.0 | 69.0 | 5                                     | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 19               | 21 | 15 | 13 | 6             | 6.5  | 7       | 7    | 80.8  | 43.0   | 43.0   | 49.0   | 7       | 14   | 69.0  | 77.0  | 7       | 14   | 48.0 | 50.0 | 7                | 8    | 7       | 7    | 74.4 | 185    | 197    | 209    | 7       | 6.5  | 60.0 | 69.0 | 5                                     | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 20               | 23 | 16 | 13 | 6             | 6    | 7       | 7    | 80.3  | 44.0   | 44.0   | 50.0   | 7       | 14   | 69.0  | 76.0  | 7       | 14   | 47.0 | 50.0 | 7                | 7    | 7       | 7.5  | 74.0 | 187    | 199    | 211    | 7       | 7    | 59.0 | 70.0 | 5                                     | 12   | 6       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 22               | 24 | 17 | 13 | 6             | 6    | 7       | 7.5  | 80.1  | 46.0   | 46.0   | 52.0   | 7       | 14   | 68.0  | 76.0  | 7       | 14   | 47.0 | 50.0 | 7                | 7    | 7       | 7.5  | 73.3 | 188    | 200    | 212    | 7       | 6.5  | 59.0 | 70.0 | 5                                     | 12   | 6       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 23               | 25 | 17 | 13 | 7             | 7.5  | 7       | 7    | 79.4  | 47.0   | 47.0   | 53.0   | 7       | 14   | 67.0  | 76.0  | 7       | 14   | 47.0 | 50.0 | 7                | 6    | 7       | 7    | 72.5 | 189    | 201    | 213    | 7       | 6    | 59.0 | 70.0 | 5                                     | 12   | 6       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 25               | 27 | 18 | 13 | 7             | 7    | 7       | 7    | 79.6  | 49.0   | 49.0   | 55.0   | 7       | 14   | 67.0  | 76.0  | 7       | 14   | 47.0 | 50.0 | 7                | 6.5  | 7       | 7.5  | 72.5 | 191    | 203    | 215    | 7       | 6    | 59.0 | 70.0 | 5                                     | 12   | 6       | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 26               | 29 | 19 | 13 | 7             | 7    | 7       | 7    | 79.6  | 50.0   | 50.0   | 50.0   | 7       | 13   | 66.0  | 76.0  | 7       | 13   | 46.0 | 50.0 | 7                | 6    | 6       | 6    | 69.5 | 193    | 205    | 217    | 8       | 7.5  | 65.0 | 76.0 | 5                                     | 12   | 6       | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 27               | 30 | 19 | 13 | 7             | 6.5  | 7       | 6.5  | 79.3  | 51.0   | 51.0   | 57.0   | 7       | 13   | 66.0  | 76.0  | 7       | 13   | 46.0 | 49.0 | 8                | 7.5  | 7       | 7.5  | 72.1 | 194    | 206    | 218    | 8       | 7.5  | 65.0 | 77.0 | 5                                     | 12   | 6       | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 29               | 31 | 20 | 13 | 7             | 6    | 7       | 7    | 79.5  | 53.0   | 53.0   | 59.0   | 7       | 12   | 65.0  | 75.0  | 7       | 12   | 44.0 | 47.0 | 8                | 7    | 7       | 8    | 71.9 | 195    | 207    | 219    | 8       | 7    | 65.0 | 77.0 | 5                                     | 12   | 6       | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 30               | 33 | 21 | 13 | 7             | 6    | 7       | 7    | 79.9  | 54.0   | 54.0   | 54.0   | 7       | 12   | 65.0  | 75.0  | 7       | 12   | 44.0 | 47.0 | 8                | 7    | 6       | 6    | 69.0 | 197    | 209    | 221    | 8       | 6.5  | 65.0 | 77.0 | 5                                     | 12   | 6       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 31               | 34 | 22 | 13 | 8             | 7.5  | 7       | 6.5  | 80.1  | 55.0   | 61.0   | 61.0   | 8       | 15   | 73.0  | 82.0  | 8       | 15   | 52.0 | 55.0 | 8                | 7    | 7       | 7.5  | 71.9 | 198    | 210    | 222    | 8       | 6.5  | 65.0 | 77.0 | 5                                     | 12   | 6       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 32               | 35 | 22 | 13 | 8             | 7    | 7       | 6    | 79.8  | 56.0   | 62.0   | 62.0   | 8       | 14   | 73.0  | 82.0  | 8       | 14   | 52.0 | 54.0 | 8                | 6.5  | 7       | 7.5  | 71.6 | 199    | 211    | 223    | 8       | 6.5  | 65.0 | 77.0 | 5                                     | 12   | 6       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 33               | 36 | 23 | 13 | 8             | 6.5  | 7       | 6.5  | 80.4  | 57.0   | 63.0   | 63.0   | 8       | 13   | 73.0  | 82.0  | 8       | 13   | 51.0 | 54.0 | 8                | 6    | 7       | 7.5  | 71.8 | 200    | 212    | 224    | 8       | 6    | 65.0 | 77.0 | 5                                     | 12   | 7       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 34               | 38 | 24 | 13 | 8             | 6.5  | 7       | 6.5  | 81.1  | 58.0   | 64.0   | 64.0   | 8       | 13   | 72.0  | 81.0  | 8       | 13   | 51.0 | 53.0 | 8                | 6.5  | 7       | 7    | 72.4 | 202    | 214    | 226    | 8       | 6    | 65.0 | 78.0 | 5                                     | 12   | 7       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 35               | 39 | 25 | 13 | 8             | 6.5  | 7       | 6.5  | 81.9  | 59.0   | 65.0   | 65.0   | 8       | 13   | 72.0  | 81.0  | 8       | 13   | 50.0 | 52.0 | 8                | 6.5  | 7       | 7    | 72.5 | 203    | 215    | 227    | 8       | 6    | 65.0 | 78.0 | 5                                     | 12   | 7       | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 36               | 40 | 26 | 13 | 8             | 6.5  | 7       | 6.5  | 82.5  | 60.0   | 66.0   | 66.0   | 8       | 13   | 72.0  | 80.0  | 8       | 13   | 50.0 | 52.0 | 8                | 6.5  | 7       | 7    | 72.9 | 204    | 216    | 228    | 9       | 7.5  | 71.0 | 84.0 | 5                                     | 12   | 7       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 37               | 41 | 27 | 13 | 8             | 6.5  | 7       | 6    | 83.3  | 67.0   | 67.0   | 67.0   | 8       | 12   | 72.0  | 79.0  | 8       | 12   | 49.0 | 51.0 | 8                | 6.5  | 7       | 7    | 73.1 | 205    | 217    | 229    | 9       | 7    | 71.0 | 84.0 | 5                                     | 12   | 7       | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 38               | 42 | 27 | 13 | 8             | 6    | 7       | 6.5  | 81.8  | 68.0   | 68.0   | 68.0   | 8       | 12   | 71.0  | 79.0  | 8       | 12   | 49.0 | 50.0 | 8                | 6    | 7       | 7    | 71.4 | 206    | 218    | 230    | 9       | 7    | 71.0 | 84.0 | 5                                     | 12   | 6       | 6    | 0  |  |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

BRYAN A. HARTNAGEL

NUMBER PE-2002024473

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE TRIPLE BOX CULVERT

MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS

SPAN (S): 15 FEET  
HEIGHT (HT): 14 THRU 16 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

703.87A

SHEET NO.  
25 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

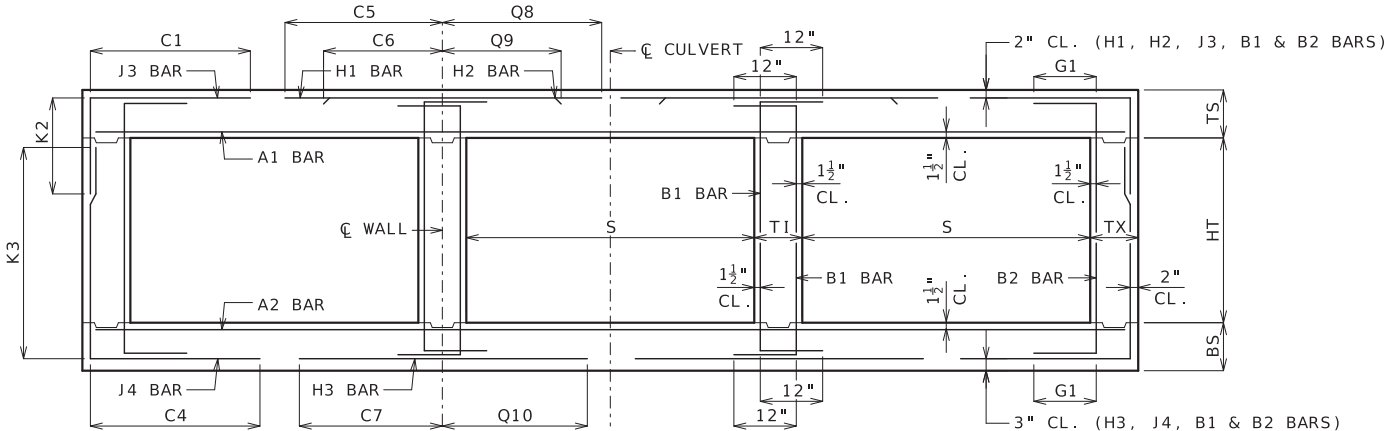


| SPAN (S) = 16 FT |                  |    |    |    |               |      |         |      |      |       |         |        |      |      |         |       |      |      |         |      |                  |      |      |      |         |       |       |        |         |      |         | HEIGHT (HT) = 8 FT OR 9 FT OR 10 FT |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|-------|---------|--------|------|------|---------|-------|------|------|---------|------|------------------|------|------|------|---------|-------|-------|--------|---------|------|---------|-------------------------------------|-----------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |       |         |        |      |      |         |       |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |       |       |        |         |      |         |                                     | WALL BARS |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |       | H1 BARS |        |      |      | H2 BARS |       |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |       |       |        | B1 BARS |      | B2 BARS |                                     |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2    |         |        | SIZE | SPA. | C5      | Q8    | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3    |       |        | SIZE    | SPA. | C7      | Q10                                 | SIZE      | SPA. | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=8' | HT=9'   | HT=10' |      |      |         |       |      |      |         |      |                  |      |      |      |         | HT=8' | HT=9' | HT=10' |         |      |         |                                     |           |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15               | 10 | 9  | 8  | 6             | 7.5  | 5       | 8    | 77.1 | 35.0  | 35.0    | 35.0   | 6    | 16   | 154.5   | 117.5 | 6    | 16   | 52.0    | 57.0 | 5                | 7    | 6    | 6    | 64.6    | 102   | 114   | 126    | 7       | 6.5  | 66.0    | 71.0                                | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2 FT             | 16               | 11 | 9  | 8  | 6             | 7    | 5       | 8    | 77.1 | 36.0  | 36.0    | 36.0   | 6    | 14   | 154.5   | 117.5 | 6    | 14   | 48.0    | 53.0 | 5                | 6.5  | 6    | 6.5  | 59.3    | 103   | 115   | 127    | 7       | 7    | 65.0    | 71.0                                | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 2'- 4'           | 16               | 11 | 9  | 8  | 6             | 6.5  | 5       | 6    | 77.1 | 36.0  | 36.0    | 36.0   | 6    | 12   | 154.5   | 117.5 | 6    | 12   | 48.0    | 53.0 | 6                | 8    | 6    | 6    | 59.3    | 103   | 115   | 127    | 7       | 6    | 65.0    | 71.0                                | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 4 FT             | 13               | 11 | 9  | 8  | 6             | 6.5  | 5       | 6    | 55.9 | 33.0  | 33.0    | 33.0   | 6    | 12   | 87.0    | 115.0 | 6    | 12   | 42.0    | 45.0 | 6                | 8    | 6    | 6    | 54.0    | 103   | 115   | 127    | 7       | 6    | 64.0    | 71.0                                | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 6 FT             | 13               | 12 | 10 | 8  | 6             | 7    | 5       | 6    | 51.4 | 33.0  | 33.0    | 33.0   | 7    | 15   | 75.0    | 91.0  | 7    | 15   | 42.0    | 45.0 | 6                | 7    | 6    | 6.5  | 51.4    | 104   | 116   | 128    | 7       | 6    | 62.0    | 70.0                                | 5         | 12   | 5    | 12   | 12 |  |  |  |  |  |  |  |  |  |  |
| 8 FT             | 14               | 14 | 10 | 8  | 6             | 7    | 5       | 6    | 47.3 | 34.0  | 34.0    | 34.0   | 7    | 15   | 70.0    | 81.0  | 7    | 15   | 41.0    | 43.0 | 6                | 7.5  | 5    | 6.5  | 44.5    | 106   | 118   | 130    | 7       | 6    | 61.0    | 71.0                                | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 10 FT            | 15               | 16 | 10 | 8  | 6             | 6.5  | 6       | 8    | 53.6 | 35.0  | 35.0    | 35.0   | 7    | 14   | 75.0    | 85.0  | 7    | 14   | 48.0    | 51.0 | 6                | 7    | 5    | 7    | 41.6    | 108   | 120   | 132    | 7       | 6.5  | 60.0    | 72.0                                | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 12 FT            | 16               | 17 | 10 | 8  | 6             | 6.5  | 6       | 8    | 51.3 | 36.0  | 36.0    | 36.0   | 7    | 13   | 73.0    | 83.0  | 7    | 13   | 47.0    | 50.0 | 6                | 6.5  | 5    | 6.5  | 40.1    | 109   | 121   | 133    | 7       | 6    | 60.0    | 72.0                                | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 14 FT            | 18               | 19 | 10 | 8  | 6             | 6    | 6       | 8    | 49.0 | 38.0  | 38.0    | 38.0   | 7    | 14   | 71.0    | 83.0  | 7    | 14   | 47.0    | 50.0 | 6                | 6    | 5    | 6.5  | 38.8    | 111   | 123   | 135    | 7       | 6.5  | 59.0    | 73.0                                | 5         | 12   | 5    | 12   | 0  |  |  |  |  |  |  |  |  |  |  |
| 16 FT            | 19               | 20 | 10 | 8  | 6             | 6    | 6       | 7.5  | 47.6 | 39.0  | 39.0    | 39.0   | 7    | 13   | 69.0    | 82.0  | 7    | 13   | 46.0    | 50.0 | 6                | 6    | 5    | 6.5  | 37.8    | 112   | 124   | 136    | 7       | 6    | 59.0    | 73.0                                | 5         | 12   | 5    | 11   | 0  |  |  |  |  |  |  |  |  |  |  |
| 18 FT            | 20               | 22 | 10 | 8  | 7             | 7    | 6       | 7.5  | 46.9 | 40.0  | 40.0    | 40.0   | 7    | 13   | 69.0    | 81.0  | 7    | 13   | 46.0    | 50.0 | 7                | 7.5  | 5    | 6.5  | 36.8    | 114   | 126   | 138    | 7       | 6.5  | 59.0    | 73.0                                | 5         | 12   | 5    | 9.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 20 FT            | 22               | 23 | 10 | 8  | 7             | 7.5  | 6       | 7.5  | 45.6 | 42.0  | 42.0    | 42.0   | 7    | 13   | 68.0    | 81.0  | 7    | 13   | 46.0    | 50.0 | 7                | 6.5  | 5    | 6    | 36.5    | 115   | 127   | 139    | 7       | 6    | 59.0    | 73.0                                | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 22 FT            | 24               | 25 | 10 | 8  | 7             | 7.5  | 6       | 7.5  | 45.0 | 44.0  | 44.0    | 44.0   | 7    | 13   | 67.0    | 81.0  | 7    | 13   | 46.0    | 50.0 | 7                | 6.5  | 5    | 6    | 36.3    | 117   | 129   | 141    | 7       | 6.5  | 59.0    | 73.0                                | 5         | 12   | 5    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 24 FT            | 25               | 27 | 11 | 8  | 7             | 7    | 6       | 7.5  | 45.9 | 45.0  | 45.0    | 45.0   | 7    | 12   | 67.0    | 80.0  | 7    | 12   | 46.0    | 50.0 | 7                | 6.5  | 5    | 6    | 36.4    | 119   | 131   | 143    | 7       | 6    | 59.0    | 73.0                                | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 26 FT            | 27               | 28 | 11 | 8  | 7             | 6.5  | 6       | 7.5  | 45.1 | 47.0  | 47.0    | 47.0   | 7    | 12   | 66.0    | 80.0  | 7    | 12   | 45.0    | 50.0 | 7                | 6    | 5    | 6    | 36.4    | 120   | 132   | 144    | 7       | 6    | 59.0    | 73.0                                | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 28 FT            | 28               | 30 | 11 | 8  | 7             | 6    | 6       | 7    | 45.0 | 52.0  | 52.0    | 52.0   | 7    | 12   | 66.0    | 80.0  | 7    | 12   | 45.0    | 50.0 | 8                | 7.5  | 6    | 7    | 39.0    | 122   | 134   | 146    | 8       | 7.5  | 65.0    | 79.0                                | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 30 FT            | 30               | 31 | 11 | 8  | 7             | 6    | 6       | 6.5  | 44.6 | 54.0  | 54.0    | 54.0   | 7    | 12   | 66.0    | 79.0  | 7    | 12   | 44.0    | 48.0 | 8                | 7    | 6    | 7    | 39.0    | 123   | 135   | 147    | 8       | 7    | 65.0    | 79.0                                | 5         | 12   | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 32 FT            | 31               | 33 | 12 | 8  | 8             | 7.5  | 6       | 7.5  | 45.5 | 55.0  | 55.0    | 55.0   | 8    | 15   | 74.0    | 87.0  | 8    | 15   | 52.0    | 56.0 | 8                | 7    | 6    | 7    | 39.4    | 125   | 137   | 149    | 8       | 6.5  | 65.0    | 80.0                                | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 34 FT            | 33               | 34 | 12 | 8  | 8             | 7    | 6       | 7    | 45.3 | 57.0  | 57.0    | 57.0   | 8    | 14   | 73.0    | 86.0  | 8    | 14   | 51.0    | 54.0 | 8                | 6.5  | 6    | 7    | 39.5    | 126   | 138   | 150    | 8       | 6.5  | 65.0    | 80.0                                | 5         | 12   | 5    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |
| 36 FT            | 34               | 36 | 12 | 8  | 8             | 7    | 6       | 6.5  | 45.3 | 58.0  | 58.0    | 58.0   | 8    | 14   | 73.0    | 85.0  | 8    | 14   | 50.0    | 53.0 | 8                | 6.5  | 6    | 6.5  | 39.4    | 128   | 140   | 152    | 8       | 6    | 65.0    | 80.0                                | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 38 FT            | 35               | 37 | 12 | 8  | 8             | 6.5  | 6       | 6.5  | 45.3 | 59.0  | 59.0    | 59.0   | 8    | 13   | 73.0    | 85.0  | 8    | 13   | 50.0    | 53.0 | 8                | 6.5  | 6    | 6.5  | 39.4    | 129   | 141   | 153    | 8       | 6    | 65.0    | 80.0                                | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 40 FT            | 36               | 39 | 13 | 8  | 8             | 6    | 6       | 6.5  | 46.1 | 60.0  | 60.0    | 60.0   | 8    | 12   | 73.0    | 84.0  | 8    | 12   | 50.0    | 52.0 | 8                | 6.5  | 6    | 6    | 39.9    | 131   | 143   | 155    | 8       | 6    | 65.0    | 80.0                                | 5         | 12   | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 42 FT            | 38               | 40 | 13 | 8  | 8             | 6    | 6       | 6    | 46.0 | 62.0  | 62.0    | 62.0   | 8    | 12   | 72.0    | 83.0  | 8    | 12   | 48.0    | 50.0 | 8                | 6.5  | 6    | 6    | 40.1    | 132   | 144   | 156    | 9       | 7    | 71.0    | 86.0                                | 5         | 12   | 5    | 6    | 0  |  |  |  |  |  |  |  |  |  |  |
| 44 FT            | 39               | 41 | 13 | 8  | 8             | 6    | 6       | 6    | 46.0 | 63.0  | 63.0    | 63.0   | 8    | 12   | 72.0    | 82.0  | 8    | 12   | 48.0    | 49.0 | 8                | 6    | 7    | 7    | 43.3    | 133   | 145   | 157    | 9       | 7    | 71.0    | 86.0                                | 5         | 12   | 6    | 8    | 0  |  |  |  |  |  |  |  |  |  |  |
| 46 FT            | 40               | 42 | 13 | 8  | 8             | 6    | 7       | 7    | 51.1 | 70.0  | 70.0    | 70.0   | 8    | 12   | 72.0    | 82.0  | 8    | 12   | 47.0    | 48.0 | 8                | 6    | 7    | 7    | 43.4    | 134   | 146   | 158    | 9       | 7    | 71.0    | 86.0                                | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 48 FT            | 41               | 43 | 13 | 8  | 9             | 7.5  | 7       | 7    | 51.1 | 71.0  | 71.0    | 71.0   | 9    | 15   | 79.0    | 89.0  | 9    | 15   | 55.0    | 56.0 | 8                | 6    | 7    | 6.5  | 43.5    | 135   | 147   | 159    | 9       | 7    | 70.0    | 86.0                                | 5         | 12   | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |  |  |
| 50 FT            | 42               | 45 | 13 | 8  | 9             | 7    | 7       | 6    | 51.4 | 72.0  | 72.0    | 72.0   | 9    | 15   | 79.0    | 88.0  | 9    | 15   | 55.0    | 56.0 | 8                | 6    | 7    | 6.5  | 43.8    | 137   | 149   | 161    | 9       | 7    | 70.0    | 86.0                                | 5         | 10.5 | 6    | 7    | 0  |  |  |  |  |  |  |  |  |  |  |

| SPAN (S) = 16 FT |                  |    |    |    |               |      |         |      |      |        |         |        |      |      |         |       |      |      |         |      |                  |      |      |      |         |     |        |        |         |         |      |      |           | HEIGHT (HT) = 11 FT OR 12 FT OR 13 FT |      |      |    |  |  |  |  |  |  |  |  |
|------------------|------------------|----|----|----|---------------|------|---------|------|------|--------|---------|--------|------|------|---------|-------|------|------|---------|------|------------------|------|------|------|---------|-----|--------|--------|---------|---------|------|------|-----------|---------------------------------------|------|------|----|--|--|--|--|--|--|--|--|
| DESIGN FILL      | MEMBER THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |         |        |      |      |         |       |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |     |        |        |         |         |      |      | WALL BARS |                                       |      |      |    |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    | A1 BARS       |      | J3 BARS |      |      |        | H1 BARS |        |      |      | H2 BARS |       |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |     |        |        | B1 BARS | B2 BARS |      |      |           |                                       |      |      |    |  |  |  |  |  |  |  |  |
|                  | TS               | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |         |        | SIZE | SPA. | C5      | Q8    | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3  |        |        | SIZE    | SPA.    | C7   | Q10  | SIZE      | SPA.                                  | SIZE | SPA. | G1 |  |  |  |  |  |  |  |  |
|                  |                  |    |    |    |               |      |         |      |      | HT=11' | HT=12'  | HT=13' |      |      |         |       |      |      |         |      |                  |      |      |      |         |     | HT=11' | HT=12' | HT=13'  |         |      |      |           |                                       |      |      |    |  |  |  |  |  |  |  |  |
| 1 FT             | 15               | 11 | 9  | 10 | 6             | 7.5  | 5       | 6    | 77.5 | 35.0   | 35.0    | 35.0   | 6    | 16   | 155.5   | 118.5 | 6    | 16   | 52.0    | 57.0 | 5                | 6.5  | 6    | 6    | 87.6    | 139 | 151    | 163    | 6       | 6       | 65.0 | 69.0 | 5         | 12                                    | 5    | 8.5  | 12 |  |  |  |  |  |  |  |  |
| 2 FT             | 16               | 12 | 9  | 10 | 6             | 7    | 5       | 6    | 77.5 | 36.0   | 36.0    | 36.0   | 6    | 14   | 155.5   | 118.5 | 6    | 14   | 49.0    | 54.0 | 5                | 6    | 6    | 6    | 79.0    | 140 | 152    | 164    | 6       | 6       | 64.0 | 69.0 | 5         | 12                                    | 5    | 8.5  | 12 |  |  |  |  |  |  |  |  |
| 2'- 4'           | 16               | 12 | 10 | 10 | 6             | 6.5  | 6       | 7    | 77.5 | 37.0   | 37.0    | 37.0   | 6    | 12   | 155.5   | 118.5 | 6    | 12   | 49.0    | 54.0 | 5                | 6    | 6    | 6    | 79.0    | 140 | 152    | 164    | 7       | 6.5     | 65.0 | 72.0 | 5         | 10.5                                  | 5    | 8    | 12 |  |  |  |  |  |  |  |  |
| 4 FT             | 13               | 12 | 10 | 10 | 6             | 6.5  | 6       | 7    | 76.3 | 37.0   | 37.0    | 37.0   | 6    | 12   | 91.0    | 115.0 | 6    | 12   | 42.0    | 45.0 | 5                | 6    | 6    | 6    | 69.6    | 140 | 152    | 164    | 7       | 6.5     | 65.0 | 72.0 | 5         | 10.5                                  | 5    | 8    | 12 |  |  |  |  |  |  |  |  |
| 6 FT             | 13               | 13 | 10 | 10 | 6             | 6.5  | 6       | 7    | 67.3 | 37.0   | 37.0    | 37.0   | 7    | 15   | 77.0    | 88.0  | 7    | 15   | 43.0    | 45.0 | 6                | 7.5  | 6    | 6.5  | 64.3    | 141 | 153    | 165    | 7       | 6       | 64.0 | 72.0 | 5         | 12                                    | 5    | 8    | 12 |  |  |  |  |  |  |  |  |
| 8 FT             | 14               | 14 | 10 | 10 | 6             | 7    | 6       | 6.5  | 61.5 | 38.0   | 38.0    | 38.0   | 7    | 15   | 71.0    | 79.0  | 7    | 15   | 41.0    | 44.0 | 6                | 7    | 6    | 6    | 60.3    | 142 | 154    | 166    | 7       | 6       | 62.0 | 72.0 | 5         | 12                                    | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 10 FT            | 15               | 16 | 10 | 10 | 6             | 6.5  | 6       | 6    | 63.9 | 35.0   | 39.0    | 39.0   | 7    | 14   | 76.0    | 85.0  | 7    | 14   | 49.0    | 51.0 | 6                | 6.5  | 6    | 6    | 57.6    | 144 | 156    | 168    | 7       | 6.5     | 61.0 | 72.0 | 5         | 12                                    | 5    | 8    | 0  |  |  |  |  |  |  |  |  |
| 12 FT            | 16               | 18 | 11 | 10 | 6             | 6.5  | 6       | 6    | 62.9 | 36.0   | 40.0    | 40.0   | 7    | 14   | 74.0    | 83.0  | 7    | 14   | 48.0    | 51.0 | 6                | 6.5  | 6    | 7    | 56.4    | 146 | 158    | 170    | 7       | 6.5     | 61.0 | 73.0 | 5         | 12                                    | 5    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 14 FT            | 18               | 19 | 12 | 10 | 6             | 6.5  | 6       | 6.5  | 61.8 | 38.0   | 42.0    | 42.0   | 7    | 14   | 72.0    | 82.0  | 7    | 14   | 48.0    | 51.0 | 6                | 6    | 6    | 7    | 55.8    | 147 | 159    | 171    | 7       | 6.5     | 61.0 | 73.0 | 5         | 12                                    | 5    | 7    | 0  |  |  |  |  |  |  |  |  |
| 16 FT            | 19               | 21 | 12 | 10 | 6             | 6    | 6       | 6    | 60.8 | 39.0   | 43.0    | 43.0   | 7    | 13   | 71.0    | 81.0  | 7    | 13   | 47.0    | 51.0 | 7                | 8    | 6    | 7    | 54.6    | 149 | 161    | 173    | 7       | 6.5     | 60.0 | 73.0 | 5         | 12                                    | 5    | 7    | 0  |  |  |  |  |  |  |  |  |
| 18 FT            | 20               | 22 | 12 | 10 | 7             | 8    | 7       | 8    | 64.6 | 40.0   | 44.0    | 44.0   | 7    | 13   | 70.0    | 81.0  | 7    | 13   | 47.0    | 51.0 | 7                | 7.5  | 6    | 6    | 53.8    | 150 | 162    | 174    | 7       | 6.5     | 60.0 | 73.0 | 5         | 12                                    | 5    | 7    | 0  |  |  |  |  |  |  |  |  |
| 20 FT            | 22               | 24 | 13 | 10 | 7             | 8    | 6       | 6    | 59.6 | 42.0   | 46.0    | 46.0   | 7    | 13   | 69.0    | 81.0  | 7    | 13   | 47.0    | 51.0 | 7                | 7    | 6    | 7    | 53.6    | 152 | 164    | 176    | 7       | 6.5     | 60.0 | 73.0 | 5         | 12                                    | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |
| 22 FT            | 23               | 25 | 14 | 10 | 7             | 7    | 6       | 6    | 59.8 | 43.0   | 47.0    | 47.0   | 7    | 12   | 69.0    | 80.0  | 7    | 12   | 47.0    | 50.0 | 7                | 6.5  | 6    | 7    | 53.5    | 153 | 165    | 177    | 7       | 6.5     | 60.0 | 73.0 | 5         | 12                                    | 5    | 6.5  | 0  |  |  |  |  |  |  |  |  |
| 24 FT            | 25               | 27 | 14 | 10 | 7             | 7    | 6       | 6    | 59.1 | 45.0   | 49.0    | 49.0   | 7    | 13   | 68.0    | 80.0  | 7    | 13   | 46.0    | 50.0 | 7                | 6.5  | 6    | 7    | 53.3    | 155 | 167    | 179    | 7       | 6       | 60.0 | 74.0 | 5         | 12                                    | 5    | 6    | 0  |  |  |  |  |  |  |  |  |
| 26 FT            | 27               | 29 | 14 | 10 | 7             | 6.5  | 6       | 6    | 58.6 | 51.0   | 51.0    | 51.0   | 7    | 13   | 67.0    | 80.0  | 7    | 13   | 46.0    | 50.0 | 7                | 6    | 6    | 7    | 53.0    | 157 | 169    | 181    | 8       | 7.5     | 66.0 | 80.0 | 5         | 12                                    | 5    | 6    | 0  |  |  |  |  |  |  |  |  |
| 28 FT            | 28               | 30 | 15 | 10 | 7             | 6.5  | 6       | 6    | 59.1 | 52.0   | 52.0    | 52.0   | 7    | 12   | 67.0    | 79.0  | 7    | 12   | 46.0    | 50.0 | 8                | 7.5  | 6    | 7    | 53.1    | 158 | 170    | 182    | 8       | 7.5     | 66.0 | 80.0 | 5         | 12                                    | 6    | 8    | 0  |  |  |  |  |  |  |  |  |
| 30 FT            | 30               | 32 | 15 | 10 | 7             | 6    | 6       | 6    | 58.8 | 54.0   | 54.0    | 54.0   | 7    | 12   | 67.0    | 79.0  | 7    | 12   | 45.0    | 48.0 | 8                | 7    | 6    | 7    | 53.0    | 160 | 172    | 184    | 8       | 7       | 66.0 | 80.0 | 5         | 12                                    | 6    | 8    | 0  |  |  |  |  |  |  |  |  |
| 32 FT            | 31               | 33 | 15 | 10 | 8             | 7.5  | 7       | 7    | 63.4 | 55.0   | 55.0    | 55.0   | 8    | 15   | 74.0    | 87.0  | 8    | 15   | 53.0    | 56.0 | 8                | 7    | 6    | 7    | 52.8    | 161 | 173    | 185    | 8       | 6.5     | 66.0 | 80.0 | 5         | 12                                    | 6    | 8    | 0  |  |  |  |  |  |  |  |  |
| 34 FT            | 32               | 34 | 16 | 10 | 8             | 7    | 7       | 7.5  | 63.9 | 56.0   | 56.0    | 56.0   | 8    | 14   | 74.0    | 86.0  | 8    | 14   | 52.0    | 56.0 | 8                | 6    | 6    | 7    | 52.9    | 162 | 174    | 186    | 8       | 6       | 66.0 | 80.0 | 5         | 12                                    | 6    | 8    | 0  |  |  |  |  |  |  |  |  |
| 36 FT            | 34               | 36 | 16 | 10 | 8             | 7    | 7       | 7.5  | 63.8 | 58.0   | 58.0    | 58.0   | 8    | 14   | 74.0    | 85.0  | 8    | 14   | 51.0    | 54.0 | 8                | 6.5  | 6    | 6.5  | 52.9    | 164 | 176    | 188    | 8       | 6       | 66.0 | 80.0 | 5         | 12                                    | 6    | 8    | 0  |  |  |  |  |  |  |  |  |
| 38 FT            | 35               | 37 | 17 | 10 | 8             | 6.5  | 7       | 7.5  | 64.4 | 59.0   | 59.0    | 59.0   | 8    | 13   | 74.0    | 85.0  | 8    | 13   | 51.0    | 53.0 | 8                | 6    | 6    | 6.5  | 53.1    | 165 | 177    | 189    | 8       | 6       | 66.0 | 80.0 | 5         | 12                                    | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 40 FT            | 36               | 39 | 17 | 10 | 8             | 6.5  | 7       | 7    | 64.4 | 60.0   | 60.0    | 60.0   | 8    | 13   | 73.0    | 84.0  | 8    | 13   | 50.0    | 53.0 | 8                | 6.5  | 6    | 6    | 53.1    | 167 | 179    | 191    | 8       | 6       | 66.0 | 80.0 | 5         | 12                                    | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 42 FT            | 37               | 40 | 17 | 10 | 8             | 6    | 7       | 6.5  | 64.3 | 61.0   | 61.0    | 61.0   | 8    | 12   | 73.0    | 84.0  | 8    | 12   | 50.0    | 52.0 | 8                | 6    | 6    | 6    | 53.1    | 168 | 180    | 192    | 9       | 7       | 72.0 | 86.0 | 5         | 12                                    | 6    | 7.5  | 0  |  |  |  |  |  |  |  |  |
| 44 FT            | 38               | 41 | 18 | 10 | 8             | 6    | 7       | 7    | 65.0 | 62.0   | 62.0    | 68.0   | 8    | 12   | 73.0    | 83.0  | 8    | 12   | 49.0    | 51.0 | 8                | 6    | 7    | 8    | 56.6    | 169 | 181    | 193    | 9       | 7       | 72.0 | 86.0 | 5         | 12                                    | 6    | 7    | 0  |  |  |  |  |  |  |  |  |
| 46 FT            | 39               | 43 | 19 | 10 | 8             | 6    | 7       | 7.5  | 66.0 | 63.0   | 63.0    | 69.0   | 8    | 12   | 73.0    | 82.0  | 8    | 12   | 49.0    | 51.0 | 8                | 6    | 7    | 7.5  | 57.1    | 171 | 183    | 195    | 9       | 7       | 72.0 | 87.0 | 5         | 12                                    | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |
| 48 FT            | 40               | 44 | 19 | 10 | 8             | 6    | 7       | 6.5  | 66.0 | 70.0   | 70.0    | 70.0   | 8    | 12   | 72.0    | 81.0  | 8    | 12   | 48.0    | 50.0 | 8                | 6    | 7    | 7    | 57.3    | 172 | 184    | 196    | 9       | 7       | 72.0 | 87.0 | 5         | 12                                    | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |
| 50 FT            | 41               | 45 | 20 | 10 | 9             | 7.5  | 7       | 7    | 66.9 | 71.0   | 71.0    | 71.0   | 9    | 15   | 80.0    | 88.0  | 9    | 15   | 56.0    | 57.0 | 8                | 6    | 7    | 7    | 57.6    | 173 | 185    | 197    | 9       | 6.5     | 72.0 | 87.0 | 5         | 12                                    | 6    | 6.5  | 0  |  |  |  |  |  |  |  |  |

| SPAN (S) = 16 FT |                     |    |    |    |               |      |         |      |      |        |         |        |      |      |         |       |      |      |         |      |                  |      |      |      |         |        |        |        |         |      |         | HEIGHT (HT) = 14 FT OR 15 FT OR 16 FT |      |      |      |      |           |  |  |  |  |  |  |  |  |  |
|------------------|---------------------|----|----|----|---------------|------|---------|------|------|--------|---------|--------|------|------|---------|-------|------|------|---------|------|------------------|------|------|------|---------|--------|--------|--------|---------|------|---------|---------------------------------------|------|------|------|------|-----------|--|--|--|--|--|--|--|--|--|
| DESIGN<br>FILL   | MEMBER<br>THICKNESS |    |    |    | TOP SLAB BARS |      |         |      |      |        |         |        |      |      |         |       |      |      |         |      | BOTTOM SLAB BARS |      |      |      |         |        |        |        |         |      |         |                                       |      |      |      |      | WALL BARS |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    | A1 BARS       |      | J3 BARS |      |      |        | H1 BARS |        |      |      | H2 BARS |       |      |      | A2 BARS |      | J4 BARS          |      |      |      | H3 BARS |        |        |        | B1 BARS |      | B2 BARS |                                       |      |      |      |      |           |  |  |  |  |  |  |  |  |  |
|                  | TS                  | BS | TX | TI | SIZE          | SPA. | SIZE    | SPA. | C1   | K2     |         |        | SIZE | SPA. | C5      | Q8    | SIZE | SPA. | C6      | Q9   | SIZE             | SPA. | SIZE | SPA. | C4      | K3     |        |        | SIZE    | SPA. | C7      | Q10                                   | SIZE | SPA. | SIZE | SPA. | G1        |  |  |  |  |  |  |  |  |  |
|                  |                     |    |    |    |               |      |         |      |      | HT=14' | HT=15'  | HT=16' |      |      |         |       |      |      |         |      |                  |      |      |      |         | HT=14' | HT=15' | HT=16' |         |      |         |                                       |      |      |      |      |           |  |  |  |  |  |  |  |  |  |
| 1 FT             | 15                  | 11 | 12 | 13 | 6             | 7.5  | 6       | 8    | 82.9 | 35.0   | 35.0    | 39.0   | 6    | 16   | 160.5   | 120.5 | 6    | 16   | 51.0    | 55.0 | 5                | 6.5  | 6    | 6    | 97.5    | 175    | 187    | 199    | 7       | 7    | 70.0    | 71.0                                  | 5    | 10.5 | 5    | 7    | 12        |  |  |  |  |  |  |  |  |  |
| 2 FT             | 16                  | 12 | 12 | 13 | 6             | 7.5  | 6       | 8    | 82.9 | 36.0   | 36.0    | 40.0   | 6    | 15   | 160.5   | 120.5 | 6    | 15   | 49.0    | 52.0 | 5                | 6    | 6    | 6    | 93.3    | 176    | 188    | 200    | 7       | 7    | 69.0    | 71.0                                  | 5    | 12   | 5    | 7    | 12        |  |  |  |  |  |  |  |  |  |
| 2' - 4'          | 16                  | 13 | 13 | 13 | 6             | 6.5  | 6       | 6.5  | 94.8 | 36.0   | 36.0    | 40.0   | 7    | 16   | 160.5   | 120.5 | 7    | 16   | 49.0    | 52.0 | 5                | 6    | 6    | 6    | 93.3    | 177    | 189    | 201    | 7       | 7    | 69.0    | 73.0                                  | 5    | 8.5  | 5    | 6.5  | 12        |  |  |  |  |  |  |  |  |  |
| 4 FT             | 12                  | 13 | 13 | 13 | 6             | 6.5  | 6       | 6.5  | 94.8 | 36.0   | 36.0    | 36.0   | 7    | 16   | 92.0    | 94.0  | 7    | 16   | 46.0    | 46.0 | 5                | 6    | 6    | 6.5  | 87.8    | 177    | 189    | 201    | 7       | 7    | 68.0    | 73.0                                  | 5    | 8.5  | 5    | 6.5  | 12        |  |  |  |  |  |  |  |  |  |
| 6 FT             | 13                  | 13 | 13 | 13 | 6             | 7    | 6       | 7    | 82.5 | 37.0   | 37.0    | 37.0   | 7    | 16   | 77.0    | 81.0  | 7    | 16   | 44.0    | 45.0 | 6                | 7.5  | 6    | 6    | 79.3    | 177    | 189    | 201    | 7       | 6    | 66.0    | 71.0                                  | 5    | 12   | 5    | 6.5  | 12        |  |  |  |  |  |  |  |  |  |
| 8 FT             | 14                  | 15 | 13 | 13 | 6             | 7    | 6       | 6.5  | 77.9 | 38.0   | 38.0    | 38.0   | 7    | 15   | 73.0    | 77.0  | 7    | 15   | 43.0    | 44.0 | 6                | 7.5  | 6    | 6.5  | 77.8    | 179    | 191    | 203    | 7       | 6.5  | 64.0    | 72.0                                  | 5    | 12   | 5    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 10 FT            | 15                  | 16 | 13 | 13 | 6             | 7    | 6       | 6    | 80.9 | 39.0   | 39.0    | 39.0   | 7    | 15   | 78.0    | 83.0  | 7    | 15   | 50.0    | 51.0 | 6                | 6.5  | 6    | 6    | 75.3    | 180    | 192    | 204    | 7       | 6    | 63.0    | 72.0                                  | 5    | 12   | 5    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 12 FT            | 16                  | 18 | 14 | 13 | 6             | 6.5  | 6       | 6    | 78.5 | 40.0   | 40.0    | 40.0   | 7    | 14   | 76.0    | 82.0  | 7    | 14   | 49.0    | 51.0 | 6                | 6.5  | 6    | 6    | 73.8    | 182    | 194    | 206    | 7       | 6.5  | 63.0    | 72.0                                  | 5    | 12   | 5    | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 14 FT            | 17                  | 19 | 14 | 13 | 6             | 6    | 7       | 7.5  | 81.6 | 41.0   | 41.0    | 47.0   | 7    | 13   | 74.0    | 81.0  | 7    | 13   | 49.0    | 51.0 | 6                | 6    | 7    | 7.5  | 75.0    | 183    | 195    | 207    | 7       | 6.5  | 62.0    | 72.0                                  | 5    | 12   | 5    | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 16 FT            | 19                  | 21 | 15 | 13 | 6             | 6.5  | 7       | 7.5  | 80.9 | 43.0   | 43.0    | 49.0   | 7    | 14   | 73.0    | 81.0  | 7    | 14   | 49.0    | 51.0 | 7                | 8    | 7    | 7.5  | 74.0    | 185    | 197    | 209    | 7       | 6.5  | 62.0    | 73.0                                  | 5    | 12   | 6    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 18 FT            | 20                  | 22 | 16 | 13 | 6             | 6    | 7       | 7.5  | 80.0 | 44.0   | 44.0    | 50.0   | 7    | 13   | 72.0    | 80.0  | 7    | 13   | 49.0    | 51.0 | 7                | 7.5  | 7    | 7.5  | 72.9    | 186    | 198    | 210    | 7       | 6.5  | 62.0    | 73.0                                  | 5    | 12   | 6    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 20 FT            | 22                  | 24 | 16 | 13 | 6             | 6    | 7       | 7    | 79.1 | 46.0   | 46.0    | 52.0   | 7    | 13   | 71.0    | 80.0  | 7    | 13   | 48.0    | 51.0 | 7                | 7    | 7    | 7.5  | 72.3    | 188    | 200    | 212    | 7       | 6.5  | 62.0    | 73.0                                  | 5    | 12   | 6    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 22 FT            | 23                  | 25 | 17 | 13 | 7             | 7.5  | 7       | 7    | 78.8 | 47.0   | 47.0    | 53.0   | 7    | 13   | 70.0    | 80.0  | 7    | 13   | 48.0    | 51.0 | 7                | 6    | 7    | 8    | 71.5    | 189    | 201    | 213    | 7       | 6    | 62.0    | 73.0                                  | 5    | 12   | 6    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 24 FT            | 25                  | 27 | 17 | 13 | 7             | 7    | 7       | 7    | 78.1 | 49.0   | 49.0    | 55.0   | 7    | 13   | 70.0    | 80.0  | 7    | 13   | 48.0    | 51.0 | 7                | 6.5  | 7    | 7    | 71.3    | 191    | 203    | 215    | 7       | 6    | 61.0    | 73.0                                  | 5    | 12   | 6    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 26 FT            | 26                  | 29 | 18 | 13 | 7             | 7    | 7       | 7    | 78.1 | 50.0   | 50.0    | 56.0   | 7    | 12   | 69.0    | 79.0  | 7    | 12   | 48.0    | 51.0 | 7                | 6    | 7    | 8    | 71.0    | 193    | 205    | 217    | 8       | 7.5  | 67.0    | 80.0                                  | 5    | 12   | 6    | 7    | 0         |  |  |  |  |  |  |  |  |  |
| 28 FT            | 28                  | 30 | 19 | 13 | 7             | 6.5  | 7       | 7    | 78.3 | 52.0   | 52.0    | 52.0   | 7    | 12   | 68.0    | 79.0  | 7    | 12   | 47.0    | 51.0 | 8                | 7.5  | 6    | 6    | 67.8    | 194    | 206    | 218    | 8       | 7.5  | 67.0    | 80.0                                  | 5    | 12   | 6    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 30 FT            | 29                  | 32 | 19 | 13 | 7             | 6    | 7       | 6.5  | 77.9 | 53.0   | 53.0    | 59.0   | 7    | 12   | 68.0    | 79.0  | 7    | 12   | 47.0    | 51.0 | 8                | 7    | 7    | 7.5  | 70.5    | 196    | 208    | 220    | 8       | 7    | 67.0    | 80.0                                  | 5    | 12   | 6    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 32 FT            | 31                  | 33 | 20 | 13 | 8             | 7.5  | 7       | 6.5  | 78.1 | 55.0   | 55.0    | 61.0   | 8    | 15   | 76.0    | 87.0  | 8    | 15   | 53.0    | 57.0 | 8                | 7    | 7    | 8    | 70.4    | 197    | 209    | 221    | 8       | 6.5  | 67.0    | 80.0                                  | 5    | 12   | 6    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 34 FT            | 32                  | 34 | 20 | 13 | 8             | 7.5  | 7       | 6    | 77.6 | 56.0   | 56.0    | 62.0   | 8    | 14   | 75.0    | 86.0  | 8    | 14   | 53.0    | 56.0 | 8                | 6    | 7    | 7    | 70.0    | 198    | 210    | 222    | 8       | 6    | 67.0    | 80.0                                  | 5    | 12   | 6    | 6.5  | 0         |  |  |  |  |  |  |  |  |  |
| 36 FT            | 33                  | 36 | 22 | 13 | 8             | 7    | 7       | 6.5  | 78.8 | 57.0   | 63.0    | 63.0   | 8    | 14   | 75.0    | 86.0  | 8    | 14   | 53.0    | 56.0 | 8                | 6.5  | 7    | 7.5  | 70.3    | 200    | 212    | 224    | 8       | 6    | 67.0    | 81.0                                  | 5    | 12   | 6    | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 38 FT            | 34                  | 37 | 23 | 13 | 8             | 6.5  | 7       | 6.5  | 79.1 | 58.0   | 64.0    | 64.0   | 8    | 13   | 75.0    | 85.0  | 8    | 13   | 53.0    | 56.0 | 8                | 6    | 7    | 7.5  | 70.3    | 201    | 213    | 225    | 8       | 6    | 67.0    | 81.0                                  | 5    | 12   | 6    | 6    | 0         |  |  |  |  |  |  |  |  |  |
| 40 FT            | 36                  | 39 | 23 | 13 | 8             | 6.5  | 7       | 6.5  | 79.0 | 60.0   | 66.0    | 66.0   | 8    | 13   | 75.0    | 85.0  | 8    | 13   | 51.0    | 54.0 | 8                | 6.5  | 7    | 7.5  | 70.3    | 203    | 215    | 227    | 8       | 6    | 67.0    | 81.0                                  | 5    | 12   | 7    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 42 FT            | 37                  | 40 | 23 | 13 | 8             | 6.5  | 7       | 6    | 78.9 | 61.0   | 67.0    | 67.0   | 8    | 12   | 74.0    | 84.0  | 8    | 12   | 51.0    | 53.0 | 8                | 6    | 7    | 7    | 70.3    | 204    | 216    | 228    | 9       | 7    | 73.0    | 87.0                                  | 5    | 12   | 7    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 44 FT            | 38                  | 42 | 24 | 13 | 8             | 6    | 7       | 6    | 79.8 | 68.0   | 68.0    | 68.0   | 8    | 12   | 74.0    | 83.0  | 8    | 12   | 50.0    | 52.0 | 8                | 6    | 7    | 7    | 70.8    | 206    | 218    | 230    | 9       | 7    | 73.0    | 87.0                                  | 5    | 12   | 7    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 46 FT            | 39                  | 43 | 26 | 13 | 8             | 6    | 7       | 6.5  | 81.4 | 69.0   | 69.0    | 69.0   | 8    | 12   | 74.0    | 83.0  | 8    | 12   | 50.0    | 52.0 | 8                | 6    | 7    | 7    | 71.3    | 207    | 219    | 231    | 9       | 7    | 73.0    | 87.0                                  | 5    | 12   | 7    | 7.5  | 0         |  |  |  |  |  |  |  |  |  |
| 48 FT            | 40                  | 44 | 27 | 13 | 8             | 6    | 7       | 6    | 82.1 | 70.0   | 70.0    | 70.0   | 8    | 12   | 74.0    | 82.0  | 8    | 12   | 49.0    | 51.0 | 8                | 6    | 7    | 7    | 71.6    | 208    | 220    | 232    | 9       | 7    | 73.0    | 88.0                                  | 5    | 12   | 7    | 8    | 0         |  |  |  |  |  |  |  |  |  |
| 50 FT            | 41                  | 45 | 28 | 13 | 9             | 7.5  | 7       | 6    | 83.0 | 71.0   | 71.0    | 71.0   | 9    | 15   | 82.0    | 89.0  | 9    | 15   | 57.0    | 58.0 | 8                | 6    | 7    | 7    | 72.0    | 209    | 221    | 233    | 9       | 6.5  | 73.0    | 88.0                                  | 5    | 12   | 7    | 8    | 0         |  |  |  |  |  |  |  |  |  |

BAR DIMENSIONS DIAGRAM  
SYMMETRICAL ABOUT CULVERT.



GENERAL NOTES:

IF DESIGN FILL IS BETWEEN TABULATED DESIGN FILLS, USE THE NEXT GREATER TABULATED DESIGN FILL, EXCEPT FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET. FOR DESIGN FILLS BETWEEN 2 FEET AND 4 FEET USE THE MEMBER THICKNESS, AREA OF REINFORCEMENT AND BAR DIMENSIONS FROM THE 2'- 4' TABULATED DESIGN FILL.

SPECIAL DESIGNS ARE REQUIRED WHEN THE DESIGN FILL IS LESS THAN 1 FOOT OR GREATER THAN 50 FEET.

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

DESIGN FILLS ARE MEASURED FROM THE TOP OF TOP SLAB TO THE TOP OF EARTH FILL OR ROADWAY.

CULVERTS MEET STRENGTH AND SERVICEABILITY REQUIREMENTS FOR THE DESIGN VEHICULAR LIVE LOAD HL-93 MINUS THE LANE LOAD.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



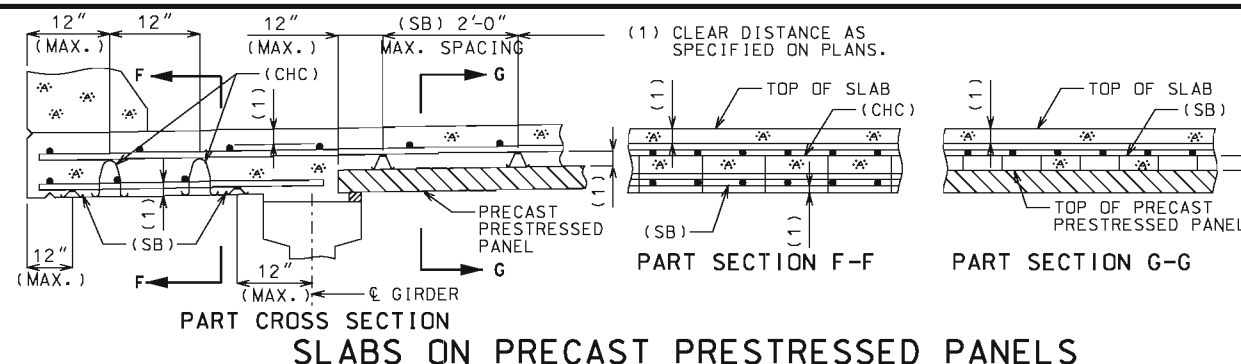
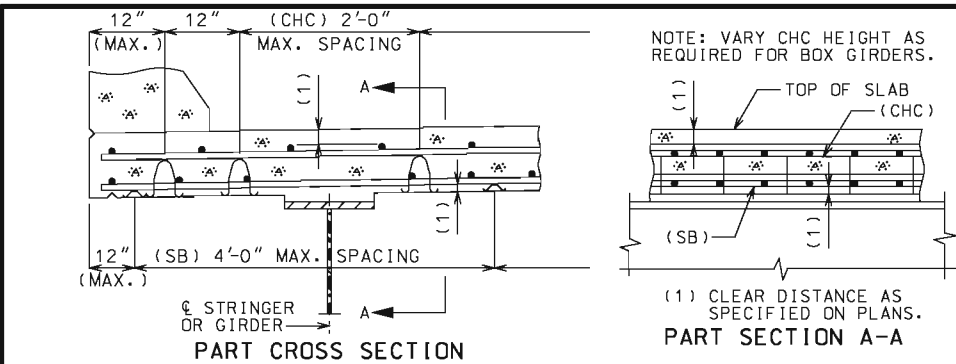
**CONCRETE TRIPLE BOX CULVERT**  
MEMBER THICKNESS  
BAR SIZE, SPACING & DIMENSIONS  
SPAN (S): 16 FEET  
HEIGHT (HT): 14 THRU 16 FEET

DATE EFFECTIVE: 7/1/2023  
DATE PREPARED: 3/22/2023

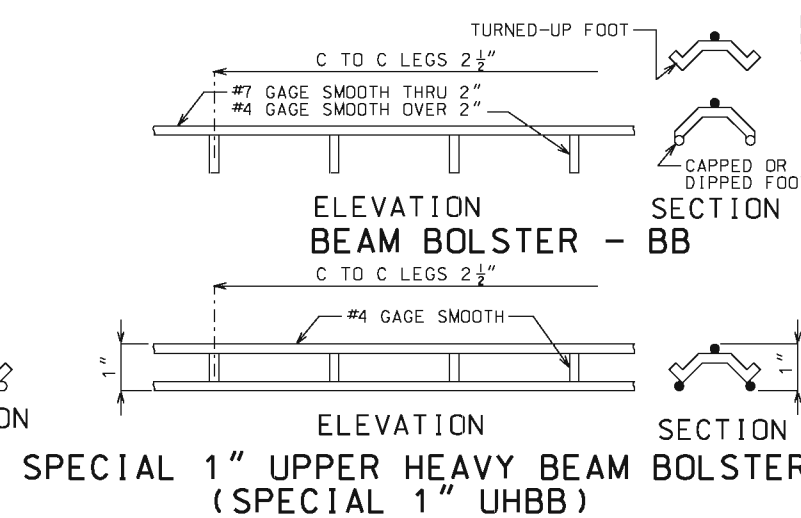
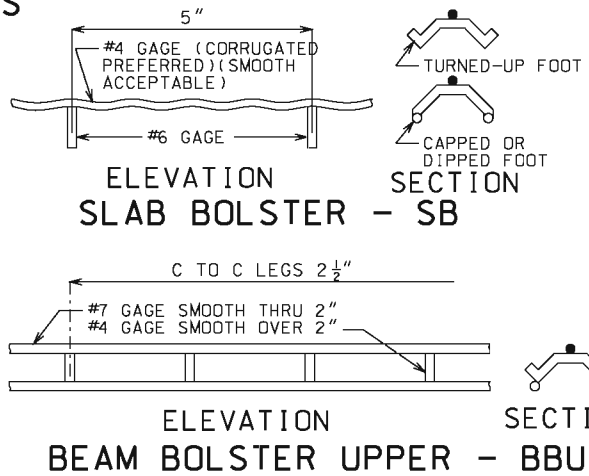
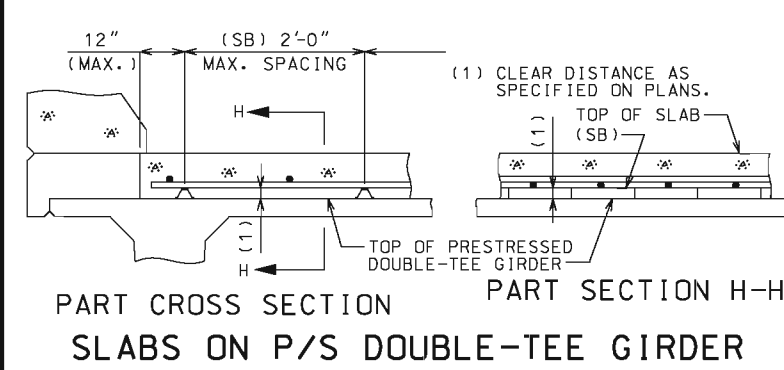
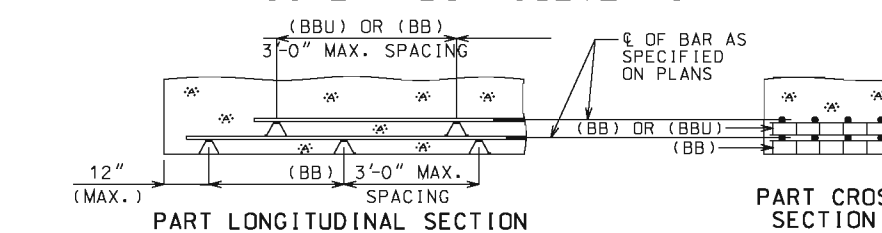
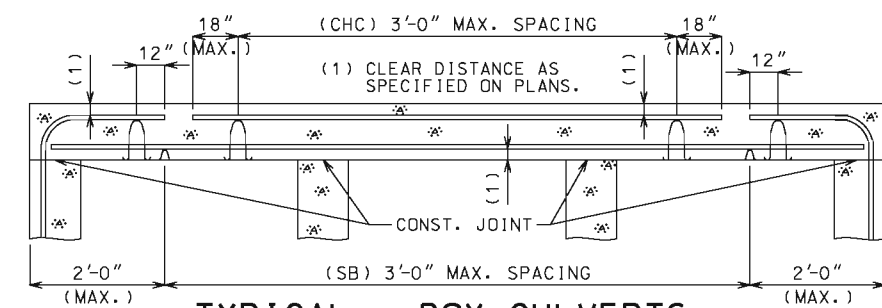
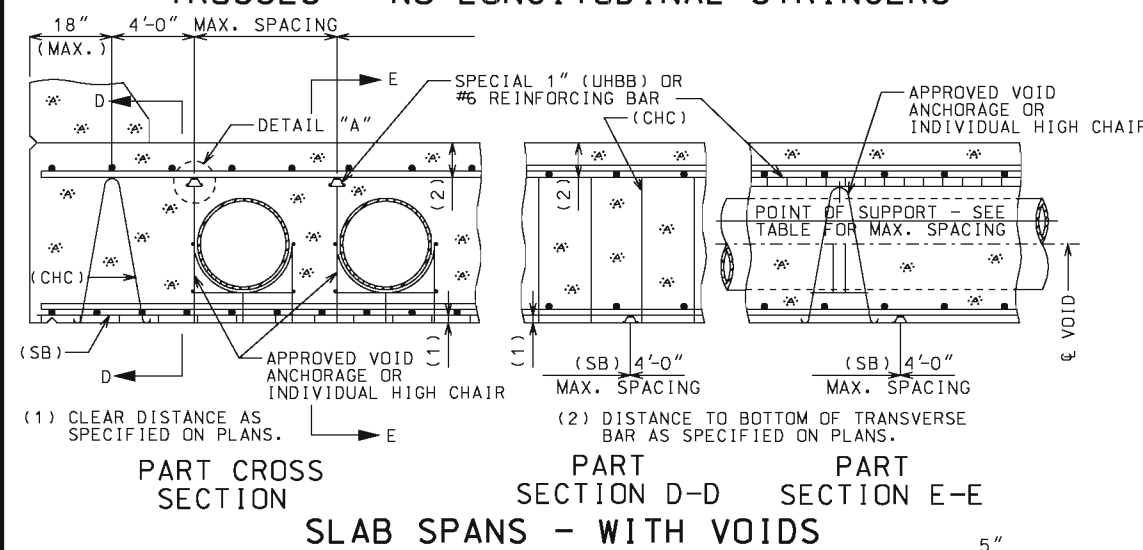
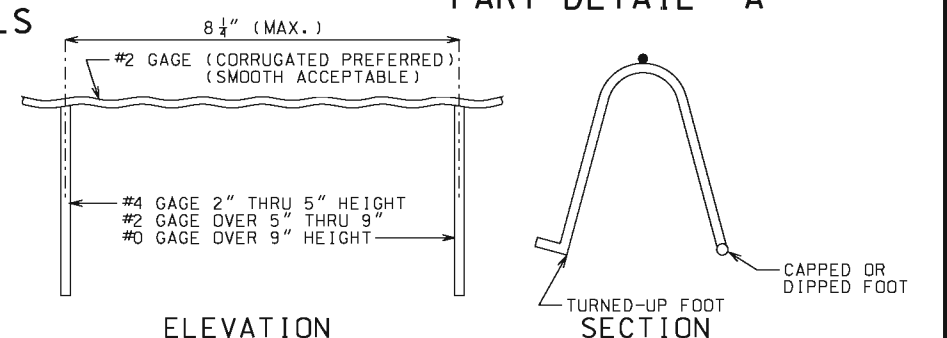
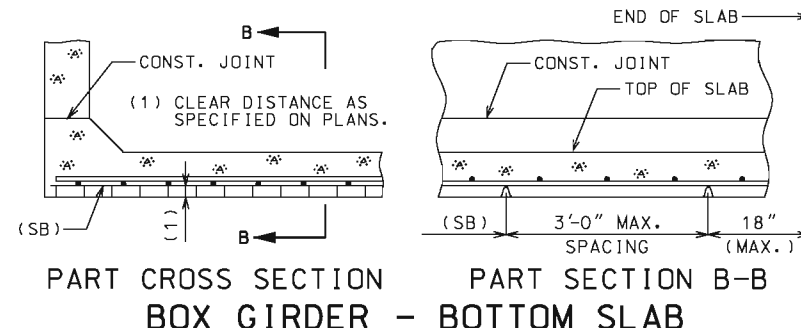
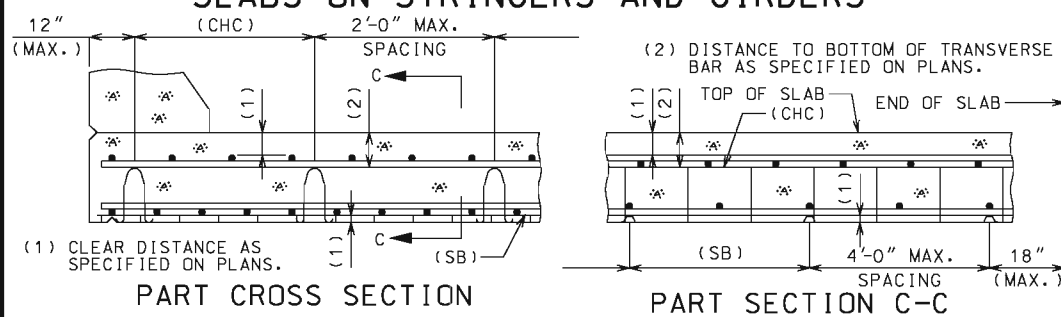
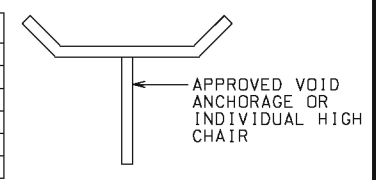
703.87A

SHEET NO.  
27 OF 27

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| VOIDS      | MAX. SPACING |
|------------|--------------|
| 14" & LESS | 4'-0"        |
| 16" & 17"  | 3'-0"        |
| 19"        | 2'-6"        |
| 21"        | 2'-0"        |
| 22"        | 2'-0"        |
| 23" & UP   | 18"          |



**ELEVATION**

**CONTINUOUS HIGH CHAIR - CHC**

ALL CONTACT POINTS ON WIRE BAR SUPPORTS SHALL BE SECURELY WELDED.

A TURNED-UP, CAPPED OR DIPPED FOOT SHALL BE ON ALL BAR SUPPORTS BEARING ON FORMS. WHERE BAR SUPPORTS ARE USED ON EARTH OR AGGREGATE SUBGRADES, SUITABLE PLATES, CONTINUOUS BARS OR PRECAST CONCRETE BAR SUPPORTS SHALL BE PROVIDED TO PREVENT DISPLACEMENT OF THE SUPPORT FOOT.

ALL DIMENSIONS TO REINFORCING STEEL ARE TO € BAR EXCEPT WHERE CLEAR DISTANCE FROM FACE OF CONCRETE IS INDICATED. HEIGHT OF BAR SUPPORTS TO BE THAT REQUIRED TO SUPPORT BARS IN EXACT POSITIONS SHOWN ON PLANS.

SPIRAL REINFORCING SHALL BE SUPPORTED BY USE OF APPROVED SPIRAL SPACERS AT NOT MORE THAN 3'-0" CENTERS. PAYMENT FOR SPACERS AND ALL OTHER BAR SUPPORTS WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR OTHER ITEMS.

WHEN BARS OF DIFFERENT SIZES ARE USED IN THE SAME MEMBERS, THE SELECTION OF BAR SUPPORTS SHALL BE BASED ON THE LARGER SIZE.

SUPPORTS FOR THE UPPER LAYERS NEED NOT BE DIRECTLY OVER THE SUPPORTS BELOW.

ALL BAR SUPPORTS SHALL BE IN ACCORDANCE WITH C.R.S.I. MANUAL OF STANDARD PRACTICE, EXCEPT AS SHOWN.

WIRE BAR AND REINFORCING BAR SUPPORTS USED WITH EPOXY COATED REINFORCING STEEL SHALL BE COATED ENTIRELY WITH AN EPOXY OR PLASTIC MATERIAL.

ALL UNCOATED WIRE BAR SUPPORTS SHALL HAVE CAPPED OR DIPPED FEET FOR THOSE APPLICATIONS WHERE MINIMIZING RUST SPOTS AND SURFACE BLEMISHES ARE EXPECTED TO BECOME VISIBLE. COLOR SHALL MATCH CONCRETE.

INDIVIDUAL HIGH CHAIRS AND SPACING WILL BE PERMITTED AS APPROVED BY THE ENGINEER. INDIVIDUAL HIGH CHAIRS SHALL NOT BE PERMITTED FOR USE ON SOLID SLAB AND VOIDED SLAB BRIDGES, EXCEPT AS SHOWN.

PLASTIC BAR SUPPORTS SHALL MEET OR EXCEED THE LOAD CARRYING CAPACITY OF AND BE PLACED AT THE SAME SPACING FOR STEEL WIRE BAR SUPPORTS AS SHOWN.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
DENNIS W. HECKMAN  
NUMBER PE-27141  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

**BAR SUPPORTS FOR CONCRETE REINFORCEMENT**

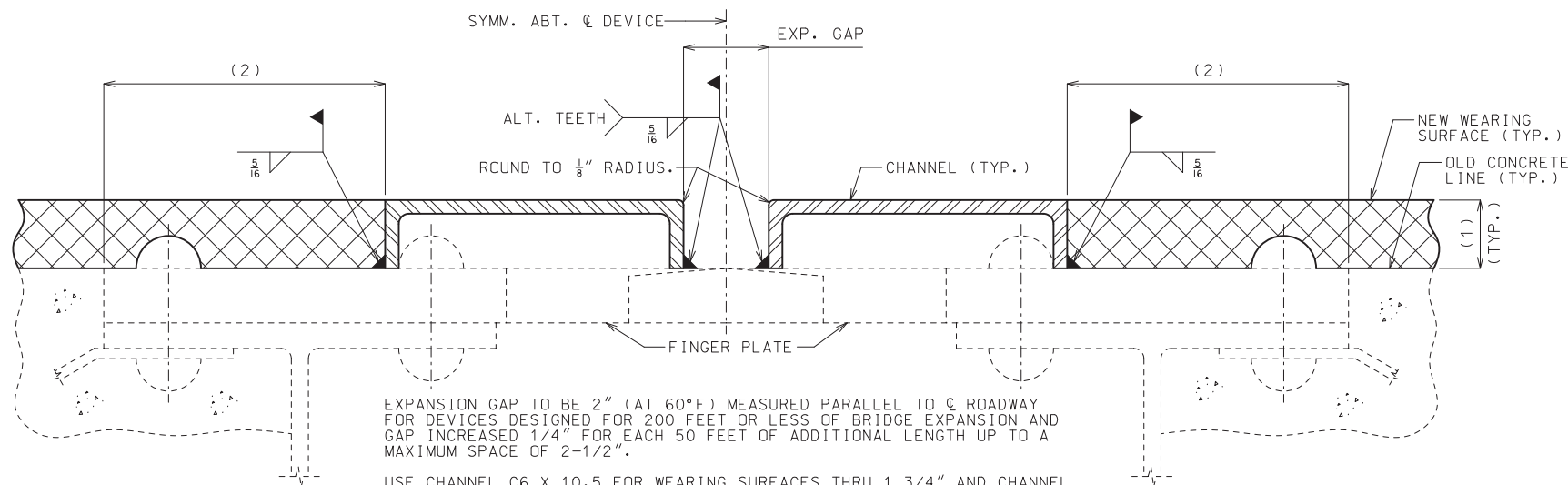
DATE EFFECTIVE: 07/01/2004  
DATE PREPARED: 9/3/2009

**706.35H**

SHEET NO.  
1 OF 1

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



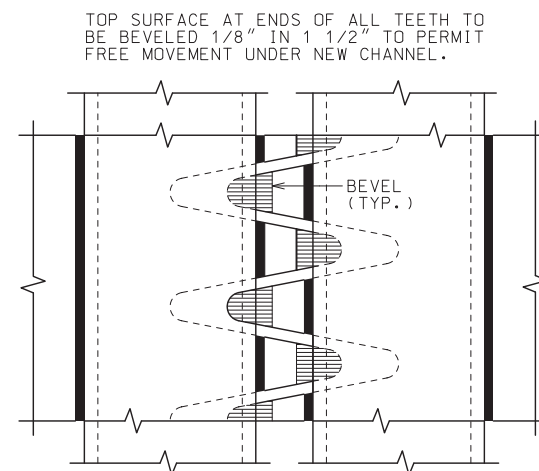


EXPANSION GAP TO BE 2" (AT 60°F) MEASURED PARALLEL TO & ROADWAY FOR DEVICES DESIGNED FOR 200 FEET OR LESS OF BRIDGE EXPANSION AND GAP INCREASED 1/4" FOR EACH 50 FEET OF ADDITIONAL LENGTH UP TO A MAXIMUM SPACE OF 2-1/2".

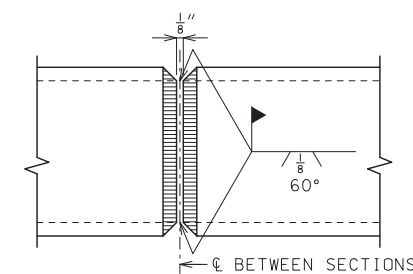
USE CHANNEL C6 X 10.5 FOR WEARING SURFACES THRU 1 3/4" AND CHANNEL C7 X 14.75 OR MC6 X 15.1 FOR WEARING SURFACES GREATER THAN 1 3/4" TO 2 1/4". CUT FLANGES TO MATCH REQUIRED WEARING SURFACE THICKNESS AND NOTCH FLANGE WHERE NECESSARY TO CLEAR RIVET HEADS.

PART SECTION THRU EXPANSION DEVICE

## TYPE A - FINGER TYPE EXPANSION DEVICES

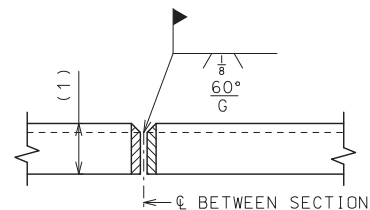


PART PLAN AT EXPANSION DEVICE

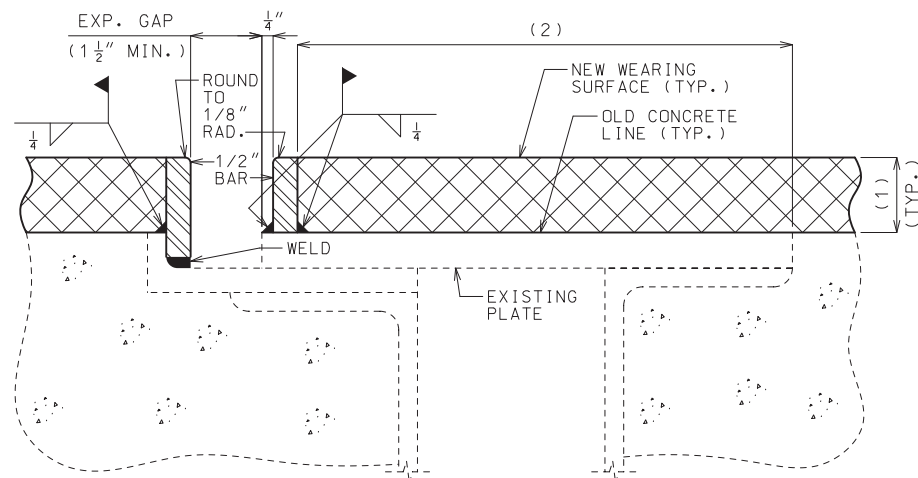


PLAN OF CHANNEL SPLICE

SPLICE TO BE AT & ROADWAY FOR TWO LANE BRIDGES.



ELEVATION OF CHANNEL SPLICE



PART SECTION AT EXPANSION DEVICE

## TYPE B - PLATE TYPE EXPANSION DEVICES

- (1) WEARING SURFACE THICKNESS
- (2) WHEN THIS DIMENSION EXCEEDS 3" AND A CONCRETE WEARING SURFACE IS USED, TACK WELD A ONE INCH BAR CHAIR TO THE PLATE OR ANGLE FOR EACH 3" OF PLATE OR ANGLE TO BE COVERED BY WEARING SURFACE.

### GENERAL NOTES:

OUTLINE OF OLD WORK IS INDICATED BY LIGHT DASHED LINES. HEAVY LINES INDICATE NEW WORK.

THE EXISTING EXPANSION DEVICE PLATES SHALL BE CHECKED FOR LOOSENESS AND SECURED BEFORE THE NEW BAR DAM IS INSTALLED.

STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH ASTM A70 GRADE 36.

QUALIFICATION OF WELDING OPERATORS WILL BE REQUIRED.

E7016 OR E7018 ELECTRODES SHALL BE USED.

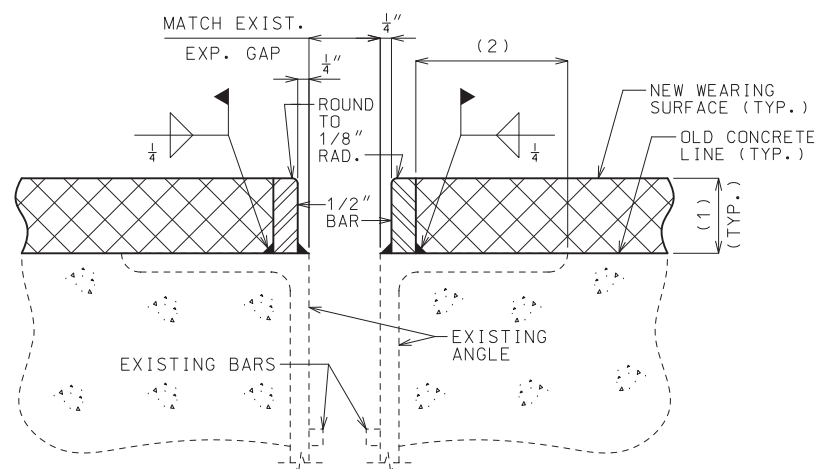
THE STEEL DAMS SHALL EXTEND FULL ROADWAY WIDTH BETWEEN CURBS, BUT SHALL BE INSTALLED IN SECTIONS OF SUCH LENGTHS TO PERMIT AT LEAST ONE WAY TRAFFIC AT ALL TIMES. BEFORE TRAFFIC IS PERMITTED TO CROSS OVER SECTIONS OF DAMS IN PLACE, SUFFICIENT WEARING SURFACE SHALL BE PLACED ON ROADWAY SLAB ADJACENT TO BOTH SIDES OF EXPANSION DEVICE TO PREVENT ANY DAMAGE TO EITHER THE STEEL DAMS OR TIRES OF VEHICLES.

STEEL DAMS SHALL BE FABRICATED AND INSTALLED TO THE CROWN AND GRADE OF THE ROADWAY.

STEEL CHANNELS OR BARS ON BOTH SIDES OF EXPANSION JOINT, FOR FULL WIDTH OF ROADWAY, WILL BE CONSIDERED COMPLETELY COVERED BY THE CONTRACT UNIT PRICE FOR STEEL BAR DAM.

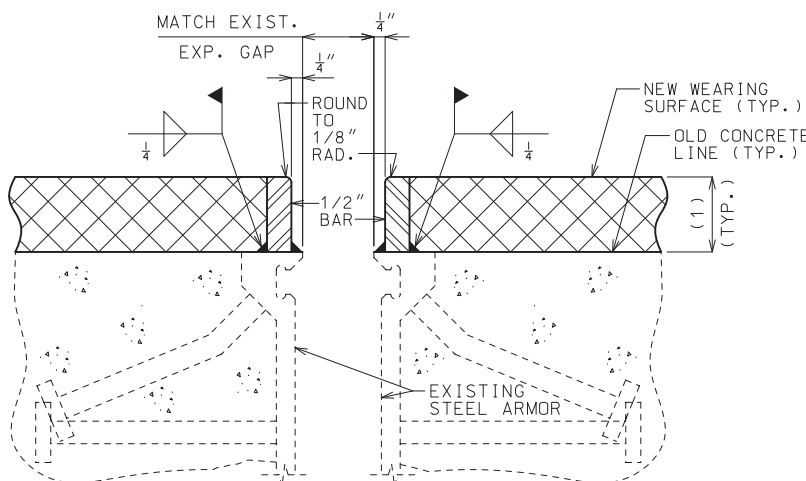
PAINT INSIDE SURFACE OF CHANNEL 5.0 MILS THICKNESS OF INORGANIC ZINC PRIMER.

SHOP DRAWINGS WILL NOT BE REQUIRED FOR STEEL BAR DAMS.



PART SECTION AT EXPANSION DEVICE

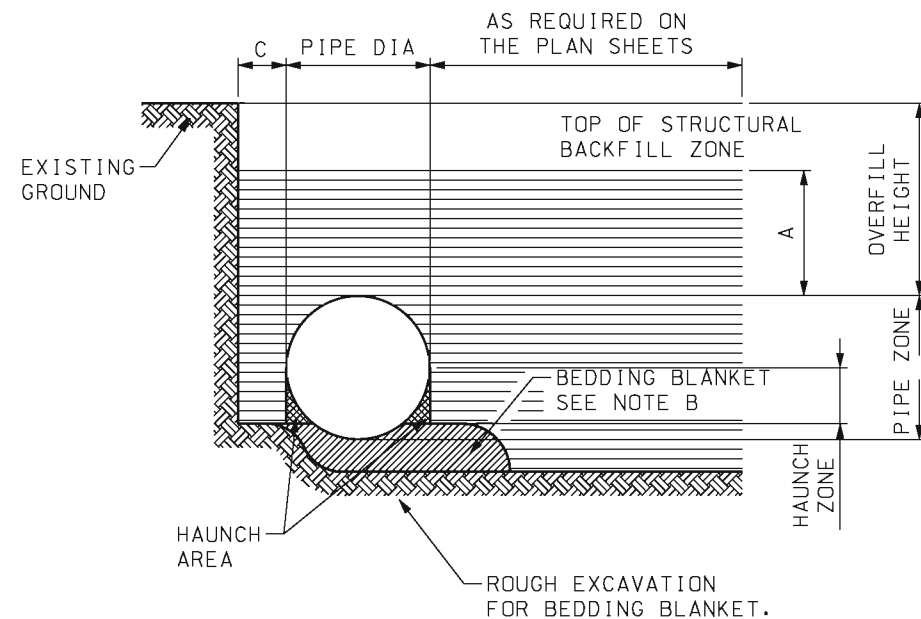
## TYPE C - ANGLE TYPE EXPANSION DEVICES



PART SECTION AT EXPANSION DEVICE

## TYPE D - STRIP SEAL TYPE EXPANSION DEVICES

|                                                        |                |                                                                                  |  |
|--------------------------------------------------------|----------------|----------------------------------------------------------------------------------|--|
|                                                        |                | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |  |
|                                                        |                | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |
| <b>STEEL DAMS</b>                                      |                | <b>AT EXPANSION DEVICES<br/>FOR RESURFACING BRIDGE FLOORS</b>                    |  |
| DATE EFFECTIVE: 10/01/2019<br>DATE PREPARED: 7/18/2019 | <b>712.40L</b> | SHEET NO.<br>1 OF 1                                                              |  |



## TYPICAL TRENCH DETAIL PIPE INSTALLATION AND BEDDING

NOTE:

- A) MINIMUM STRUCTURAL BACKFILL OVER TOP OF PIPE SHALL BE ONE-EIGHTH DIAMETER OR SPAN OF PIPE OR ONE FOOT WHICHEVER IS GREATER.
- B) BEDDING BLANKET OF LOOSE FILL SHALL BE ROUGHLY SHAPED TO FIT BOTTOM OF PIPE. MINIMUM THICKNESS BEFORE PLACING PIPE SHALL BE AS FOLLOWS:

| DEPTH OF CORRUGATION | MIN. BEDDING THICKNESS |
|----------------------|------------------------|
| $\frac{1}{2}$ "      | 1"                     |
| 1"                   | 2"                     |
| 2"                   | 3"                     |

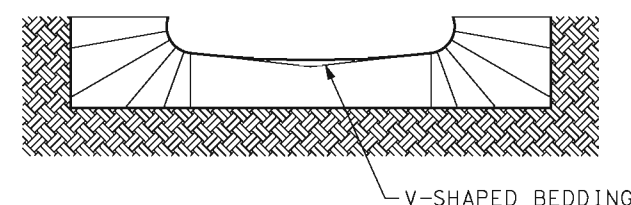
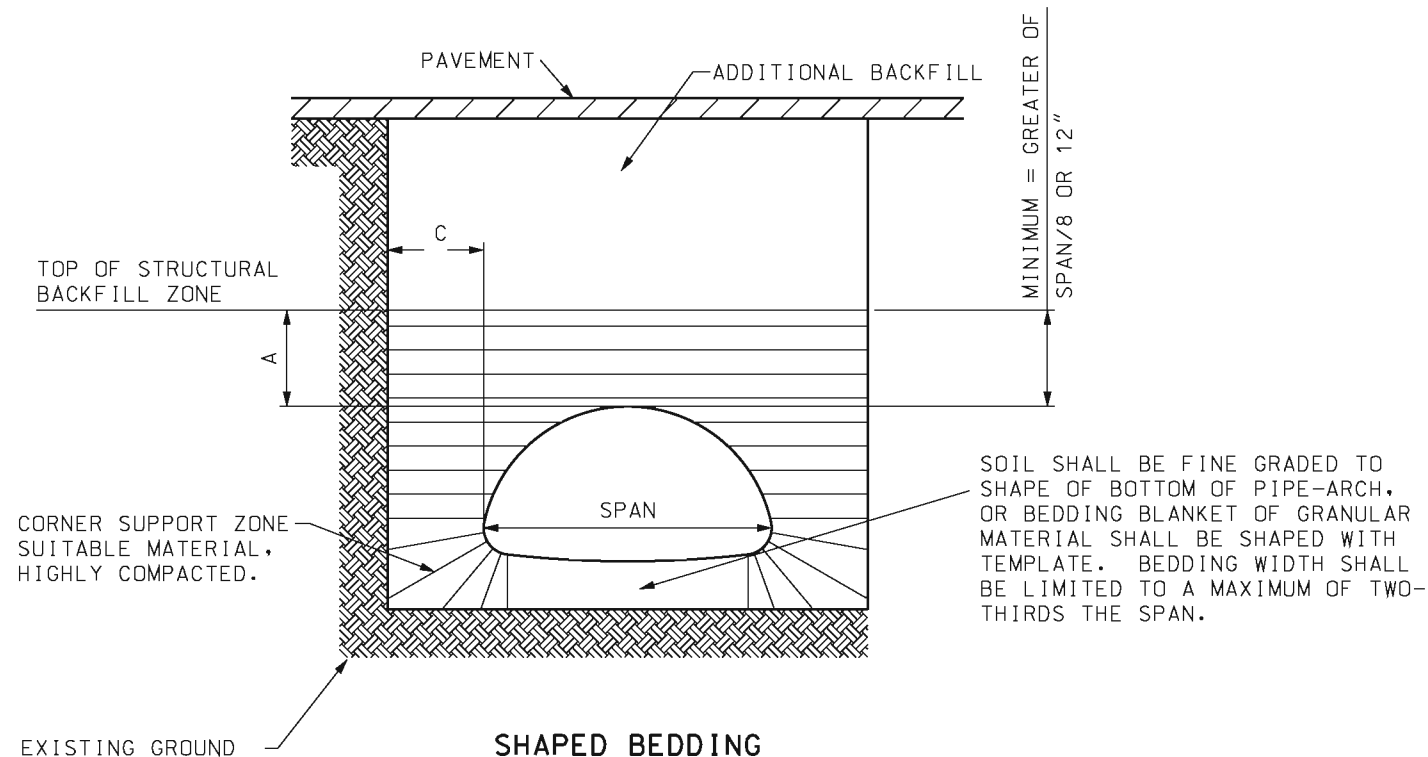
- C) TRENCH INSTALLATIONS - 2 FEET MINIMUM EACH SIDE OF CULVERT. THIS RECOMMENDED LIMIT SHOULD BE MODIFIED AS NECESSARY TO ACCOUNT FOR VARIABLES SUCH AS POOR IN-SITU SOILS. EMBANKMENT INSTALLATIONS - ONE DIAMETER OR SPAN EACH SIDE OF CULVERT.



| PIPE         |                        |
|--------------|------------------------|
| DIAMETER     | SPACE S                |
| UP TO 24"    | 12"                    |
| 24" TO 72"   | $\frac{1}{2}$ PIPE DIA |
| 72" AND OVER | 36"                    |

| PIPE-ARCHES  |                         |
|--------------|-------------------------|
| SPAN         | SPACE X                 |
| UP TO 36"    | 12"                     |
| 36" TO 108"  | $\frac{1}{3}$ ARCH SPAN |
| 108" TO 189" | 36"                     |

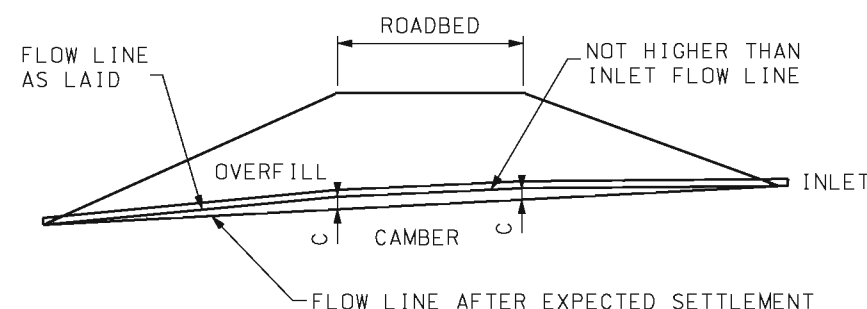
## MULTIPLE STRUCTURE SPACING



## ALTERNATIVE-SHAPED BEDDING

## PIPE-ARCH TRENCH DETAIL

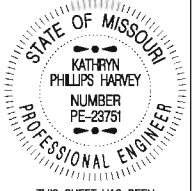
## BEDDING AND CORNER ZONE TREATMENT FOR PIPE ARCH STRUCTURES



## TYPICAL CAMBERED FLOW LINE

NOTE:

ON YIELDING SOIL, PIPE CULVERTS SHALL BE PLACED ON A CAMBERED FLOW LINE. THE AMOUNT OF CAMBER WILL VARY WITH SOIL CONDITIONS AND WILL BE SPECIFIED ON THE DESIGN PLANS.

|                                                                                                                                                                                                                                  |                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                       |
|                                                                                                                                             | <b>CORRUGATED METAL PIPE<br/>INSTALLATION METHODS</b> |
| DATE EFFECTIVE: 04/01/2011<br>DATE PREPARED: 3/10/2011                                                                                                                                                                           | <b>725.00C</b>                                        |
| SHEET NO.<br><b>1 OF 5</b>                                                                                                                                                                                                       |                                                       |

| CORRUGATED METALLIC–COATED STEEL CIRCULAR PIPE LOCK SEAM |                  |               |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
|----------------------------------------------------------|------------------|---------------|-------------------------------------------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|
| MAXIMUM ALLOWABLE OVERFILL HEIGHTS (1)                   |                  |               |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
| SPECIFIED<br>DIAMETER<br>OF PIPE                         | MINIMUM<br>COVER |               | SPECIFIED THICKNESS OF COATED SHEET (IN.) |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
|                                                          | CORRUGATED       | SPIRAL<br>RIB | 0.064                                     |     |     |     | 0.079 |     |     |     | 0.109 |     |     |     | 0.138 |     |     |     | 0.168 |     |     |     |
|                                                          |                  |               | A                                         | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   |
| IN.                                                      | FT.              | FT.           | FT.                                       | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. |
| 12                                                       | 1                | 1             | 219                                       | 251 | 224 | 144 | 273   | 314 | 280 | 201 | 382   | 440 | 392 | 334 | 492   | 566 | 504 | 484 | 602   | 693 | 617 |     |
| 15                                                       | 1                | 1             | 175                                       | 201 | 179 | 115 | 218   | 251 | 224 | 161 | 306   | 352 | 314 | 267 | 394   | 453 | 403 | 387 | 481   | 555 | 493 |     |
| 18                                                       | 1                | 1             | 146                                       | 167 | 149 | 96  | 182   | 209 | 187 | 134 | 255   | 293 | 261 | 223 | 328   | 378 | 336 | 323 | 401   | 462 | 411 |     |
| 21                                                       | 1                | 1             | 125                                       | 143 | 128 | 82  | 156   | 179 | 160 | 115 | 219   | 251 | 224 | 191 | 281   | 324 | 288 | 277 | 344   | 396 | 352 |     |
| 24                                                       | 1                | 1             | 109                                       | 126 | 112 | 72  | 137   | 157 | 140 | 100 | 191   | 220 | 196 | 167 | 246   | 283 | 252 | 242 | 301   | 347 | 308 |     |
| 30                                                       | 1                | 1             | 87                                        | 100 | 90  | 57  | 109   | 126 | 112 | 80  | 153   | 176 | 157 | 134 | 197   | 227 | 202 | 194 | 241   | 277 | 247 |     |
| 36                                                       | 1                | 1             | 73                                        | 84  | 75  | 48  | 91    | 105 | 93  | 67  | 127   | 147 | 131 | 111 | 164   | 189 | 168 | 161 | 201   | 231 | 206 |     |
| 42                                                       | 1                | 1             | 62                                        | 72  | 64  | 41  | 78    | 90  | 80  | 57  | 109   | 126 | 112 | 95  | 141   | 162 | 144 | 138 | 172   | 198 | 176 |     |
| 48                                                       | 1                | 1             | 55                                        | 63  | 56  | 36  | 68    | 78  | 70  | 50  | 96    | 110 | 98  | 83  | 123   | 142 | 126 | 121 | 150   | 173 | 154 |     |
| 54                                                       | 1                | 2             |                                           | 56  | 50  | 32* | 61    | 70  | 62  | 45  | 85    | 98  | 87  | 74  | 109   | 126 | 112 | 108 | 134   | 154 | 137 |     |
| 60                                                       | 1                | 2             |                                           | 50  | 45  |     |       | 63  | 56  | 40  | 76    | 88  | 78  | 67  | 98    | 113 | 101 | 97  | 120   | 139 | 123 |     |
| 66                                                       | 1                | 2             |                                           | 46  | 41  |     |       | 57  | 51  | 37* |       | 80  | 71  | 61  | 89    | 103 | 92  | 88  | 109   | 126 | 112 |     |
| 72                                                       | 1                | 2             |                                           | 42  | 37  |     |       | 52  | 47  |     |       | 73  | 65  | 56  | 82    | 94  | 84  | 81  | 100   | 116 | 103 |     |
| 78                                                       | 1                | 2             |                                           | 39  | 34  |     |       | 48  | 43  |     |       | 68  | 60  | 51  |       | 87  | 78  | 75  | 89    | 107 | 95  |     |
| 84                                                       | 1                | 2             |                                           | 36  | 32  |     |       | 45  | 40  |     |       | 63  | 56  | 48* |       | 81  | 72  | 69  | 77    | 99  | 88  |     |
| 90                                                       | 1                | 2             |                                           | 33  | 30  |     |       | 42  | 37  |     |       | 59  | 52  |     |       | 76  | 67  | 65  |       | 92  | 82  |     |
| 96                                                       | 1                | 2             |                                           |     |     |     |       | 39  | 35  |     |       | 55  | 49  |     |       | 71  | 63  | 60* |       | 87  | 77  |     |
| 102                                                      | 2                | 3             |                                           |     |     |     |       | 37  | 33  |     |       | 52  | 46  |     |       | 67  | 59  | 53* |       | 82  | 73  |     |
| 108                                                      | 2                | 3             |                                           |     |     |     |       |     |     |     |       | 49  | 44  |     |       | 63  | 56  |     |       | 77  | 69  |     |
| 114                                                      | 2                | 3             |                                           |     |     |     |       |     |     |     |       | 46  | 41  |     |       | 60  | 53  |     |       | 73  | 65  |     |
| 120                                                      | 2                | 3             |                                           |     |     |     |       |     |     |     |       | 44  | 39  |     |       | 57  | 50  |     |       | 69  | 62  |     |
| 126                                                      | 2                | 3             |                                           |     |     |     |       |     |     |     |       |     |     |     |       | 54  | 48  |     |       | 66  | 59  |     |

| CORRUGATED METALLIC–COATED STEEL CIRCULAR PIPE RIVETED SEAM |                  |               |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
|-------------------------------------------------------------|------------------|---------------|-------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| MAXIMUM ALLOWABLE OVERFILL HEIGHTS (1)                      |                  |               |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
| SPECIFIED<br>DIAMETER<br>OF PIPE                            | MINIMUM<br>COVER |               | SPECIFIED THICKNESS OF COATED SHEET (IN.) |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
|                                                             | CORRUGATED       | SPIRAL<br>RIB | 0.064                                     |              |              |              | 0.079        |              |              |              | 0.109        |              |              |              | 0.138        |              |              |              | 0.168        |              |              |              |
|                                                             |                  |               | SINGLE RIVET                              | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET |
| IN.                                                         | FT.              | FT.           | A                                         | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            |
| 12                                                          | 1                | 1             | 143                                       |              | 185          | 245          | 156          |              | 255          | 305          | 200          |              | 382          | 440          | 209          |              | 419          | 544          | 219          |              | 438          | 604          |
| 15                                                          | 1                | 1             | 114                                       |              | 148          | 196          | 124          |              | 204          | 244          | 160          |              | 306          | 352          | 168          |              | 335          | 436          | 175          |              | 351          | 483          |
| 18                                                          | 1                | 1             | 95                                        |              | 123          | 164          | 104          |              | 170          | 203          | 133          |              | 255          | 293          | 140          |              | 279          | 363          | 146          |              | 292          | 403          |
| 21                                                          | 1                | 1             | 82                                        |              | 105          | 140          | 89           |              | 146          | 174          | 114          |              | 219          | 251          | 120          |              | 239          | 311          | 125          |              | 251          | 345          |
| 24                                                          | 1                | 1             | 71                                        |              | 92           | 123          | 78           |              | 127          | 153          | 100          |              | 191          | 220          | 105          |              | 209          | 272          | 109          |              | 219          | 302          |
| 30                                                          | 1                | 1             | 57                                        |              | 74           | 98           | 62           |              | 102          | 122          | 80           |              | 153          | 176          | 84           |              | 168          | 218          | 88           |              | 175          | 242          |
| 36                                                          | 1                | 1             | 48                                        |              | 62           | 82           | 52           |              | 85           | 102          | 67           |              | 127          | 147          | 70           |              | 140          | 181          | 73           |              | 146          | 201          |
| 42                                                          | 1                | 1             | 41                                        |              | 53           | 70           | 44           |              | 73           | 87           | 57           |              | 109          | 126          | 60           |              | 120          | 156          | 63           |              | 125          | 173          |
| 48                                                          | 1                | 1             | 36                                        |              | 46           | 61           | 39           |              | 64           | 76           | 50           |              | 96           | 110          | 52           |              | 105          | 136          | 55           |              | 110          | 151          |
| 54                                                          | 1                | 2             |                                           |              |              | 55           | 35           |              | 57           | 68           | 44           |              | 85           | 98           | 47           |              | 93           | 121          | 49           |              | 97           | 134          |
| 60                                                          | 1                | 2             |                                           |              |              | 49           |              |              |              | 61           | 40           |              | 76           | 88           | 42           |              | 84           | 109          | 44           |              | 88           | 121          |
| 66                                                          | 1                | 2             |                                           |              |              | 45           |              |              |              | 55           |              |              | 80           | 38           |              |              | 76           | 99           | 40           |              | 80           | 110          |
| 72                                                          | 1                | 2             |                                           |              |              | 41           |              |              |              | 51           |              |              | 73           | 35           |              |              | 70           | 91           | 36           |              | 73           | 101          |
| 78                                                          | 1                | 2             |                                           |              |              | 38           |              |              |              | 47           |              |              | 68           |              |              |              | 84           | 34           |              |              | 67           | 93           |
| 84                                                          | 1                | 2             |                                           |              |              | 35           |              |              |              | 44           |              |              | 63           |              |              |              | 78           | 31           |              |              | 63           | 86           |
| 90                                                          | 1                | 2             |                                           |              |              | 33           |              |              |              | 41           |              |              | 59           |              |              |              | 73           |              |              |              |              | 81           |
| 96                                                          | 1                | 2             |                                           |              |              |              |              |              |              | 38           |              |              | 55           |              |              |              | 68           |              |              |              |              | 76           |
| 102                                                         | 2                | 3             |                                           |              |              |              |              |              |              | 36           |              |              | 52           |              |              |              | 64           |              |              |              |              | 71           |
| 108                                                         | 2                | 3             |                                           |              |              |              |              |              |              |              |              |              | 49           |              |              |              | 60           |              |              |              |              | 67           |
| 114                                                         | 2                | 3             |                                           |              |              |              |              |              |              |              |              |              | 46           |              |              |              | 57           |              |              |              |              | 64           |
| 120                                                         | 2                | 3             |                                           |              |              |              |              |              |              |              |              |              | 44           |              |              |              | 54           |              |              |              |              | 60           |
| 126                                                         | 2                | 3             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              | 52           |              |              |              |              | 58           |

\* FOR TRENCH INSTALLATION ONLY

A = 2-2/3" X 1/2" CORRUGATIONS  
B = 3" X 1" CORRUGATIONS  
C = 5" X 1" CORRUGATIONS  
D = 3/4" X 3/4" X 7-1/2" SPIRAL RIB

(1) MAXIMUM OVERFILL MEASURED FROM THE TOP OF PIPE TO SURFACE.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CORRUGATED METAL PIPE  
INSTALLATION METHODS

DATE EFFECTIVE: 04/01/2011  
DATE PREPARED: 3/22/2022

725.00C

SHEET NO.  
2 OF 5

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| CORRUGATED H32 ALUMINUM CIRCULAR PIPE LOCK SEAM |                  |               |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
|-------------------------------------------------|------------------|---------------|-------------------------------------------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|
| MAXIMUM ALLOWABLE OVERFILL HEIGHTS (1)          |                  |               |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
| SPECIFIED<br>DIAMETER<br>OF PIPE                | MINIMUM<br>COVER |               | SPECIFIED THICKNESS OF COATED SHEET (IN.) |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
|                                                 | CORRUGATED       | SPIRAL<br>RIB | 0.06                                      |     |     |     | 0.075 |     |     |     | 0.105 |     |     |     | 0.135 |     |     |     | 0.164 |     |     |     |
|                                                 |                  |               | A                                         | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   |
| IN.                                             | FT.              | FT.           | FT.                                       | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. |
| 12                                              | 1                | 1             | 132                                       | 152 |     | 71  | 165   | 191 |     | 97  | 232   | 267 |     | 156 | 298   | 357 |     | 221 | 364   | 420 |     |     |
| 15                                              | 1                | 1             | 106                                       | 122 |     | 57  | 132   | 153 |     | 78  | 185   | 213 |     | 125 | 239   | 286 |     | 176 | 291   | 336 |     |     |
| 18                                              | 1                | 1             | 88                                        | 101 |     | 47  | 110   | 127 |     | 65  | 155   | 178 |     | 104 | 199   | 238 |     | 147 | 243   | 280 |     |     |
| 21                                              | 1                | 1             | 76                                        | 87  |     | 41  | 95    | 109 |     | 56  | 132   | 152 |     | 89  | 170   | 204 |     | 126 | 208   | 240 |     |     |
| 24                                              | 1                | 1             | 66                                        | 76  |     | 35  | 83    | 96  |     | 49  | 116   | 133 |     | 78  | 149   | 178 |     | 110 | 182   | 210 |     |     |
| 30                                              | 1                | 2             |                                           | 61  |     | 28  | 66    | 76  |     | 39  | 93    | 107 |     | 62  | 119   | 143 |     | 88  | 146   | 168 |     |     |
| 36                                              | 1                | 2             |                                           | 51  |     | 24* | 55    | 64  |     | 32  | 77    | 89  |     | 52  | 99    | 119 |     | 74  | 121   | 140 |     |     |
| 42                                              | 1                | 2             |                                           | 43  |     |     |       | 55  |     | 28* | 66    | 76  |     | 45  | 85    | 102 |     | 63  | 104   | 120 |     |     |
| 48                                              | 1                | 2             |                                           | 38  |     |     |       | 48  |     |     | 58    | 67  |     | 39  | 75    | 89  |     | 55  | 91    | 105 |     |     |
| 54                                              | 1                | 2             |                                           | 34  |     |     |       | 42  |     |     | 51    | 59  |     | 35  | 66    | 79  |     | 49  | 81    | 93  |     |     |
| 60                                              | 1                | 2             |                                           | 30  |     |     |       | 38  |     |     |       | 53  |     | 31* | 55    | 71  |     | 44  | 68    | 84  |     |     |
| 66                                              | 1                | 2             |                                           | 28  |     |     |       | 35  |     |     |       | 48  |     |     |       | 65  |     | 40  | 56    | 76  |     |     |
| 72                                              | 1                | 3             |                                           | 25  |     |     |       | 32  |     |     |       | 44  |     |     |       | 59  |     | 37* | 46    | 70  |     |     |
| 78                                              | 1                | 3             |                                           |     |     |     |       | 29  |     |     |       | 41  |     |     |       | 55  |     |     |       | 65  |     |     |
| 84                                              | 1                | 3             |                                           |     |     |     |       |     |     |     |       | 38  |     |     |       | 51  |     |     |       | 60  |     |     |
| 90                                              | 1                | 3             |                                           |     |     |     |       |     |     |     |       | 36  |     |     |       | 48  |     |     |       | 56  |     |     |
| 96                                              | 1                | 3             |                                           |     |     |     |       |     |     |     |       | 33  |     |     |       | 45  |     |     |       | 53  |     |     |
| 102                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       | 42  |     |     |       | 49  |     |     |
| 108                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       | 39  |     |     |       | 47  |     |     |
| 114                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       | 42  |     |     |
| 120                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       | 39  |     |     |
| 126                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |

| CORRUGATED H32 ALUMINUM CIRCULAR PIPE RIVETED SEAM |                  |               |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
|----------------------------------------------------|------------------|---------------|-------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| MAXIMUM ALLOWABLE OVERFILL HEIGHTS (1)             |                  |               |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
| SPECIFIED<br>DIAMETER<br>OF PIPE                   | MINIMUM<br>COVER |               | SPECIFIED THICKNESS OF COATED SHEET (IN.) |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
|                                                    | CORRUGATED       | SPIRAL<br>RIB | 0.06                                      |              |              |              | 0.075        |              |              |              | 0.105        |              |              |              | 0.135        |              |              |              | 0.164        |              |              |              |
|                                                    |                  |               | SINGLE RIVET                              | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET |
| IN.                                                | FT.              | FT.           | A                                         | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            |
| 12                                                 | 1                | 1             | 77                                        |              | 120          | 141          | 77           |              | 154          | 175          | 133          |              | 269          | 239          | 138          |              | 282          | 359          | 144          |              | 291          | 466          |
| 15                                                 | 1                | 1             | 62                                        |              | 96           | 113          | 62           |              | 123          | 140          | 107          |              | 215          | 191          | 111          |              | 226          | 287          | 115          |              | 232          | 373          |
| 18                                                 | 1                | 1             | 51                                        |              | 80           | 94           | 51           |              | 103          | 117          | 89           |              | 179          | 160          | 92           |              | 188          | 239          | 96           |              | 194          | 311          |
| 21                                                 | 1                | 1             | 44                                        |              | 68           | 81           | 44           |              | 88           | 100          | 76           |              | 154          | 137          | 79           |              | 161          | 205          | 82           |              | 166          | 266          |
| 24                                                 | 1                | 1             | 38                                        |              | 60           | 71           | 38           |              | 77           | 88           | 67           |              | 135          | 120          | 69           |              | 141          | 179          | 72           |              | 145          | 233          |
| 30                                                 | 1                | 2             |                                           |              |              | 56           | 31           |              | 62           | 70           | 53           |              | 108          | 96           | 55           |              | 113          | 144          | 57           |              | 116          | 186          |
| 36                                                 | 1                | 2             |                                           |              |              | 47           | 26           |              | 51           | 58           | 44           |              | 90           | 80           | 46           |              | 94           | 120          | 48           |              | 97           | 155          |
| 42                                                 | 1                | 2             |                                           |              |              | 40           |              |              |              | 50           | 38           |              | 77           | 68           | 40           |              | 81           | 103          | 41           |              | 83           | 133          |
| 48                                                 | 1                | 2             |                                           |              |              | 35           |              |              |              | 44           | 33           |              | 67           | 60           | 35           |              | 71           | 90           | 36           |              | 73           | 116          |
| 54                                                 | 1                | 2             |                                           |              |              | 31           |              |              |              | 39           | 30           |              | 56           | 53           | 31           |              | 63           | 80           | 32           |              | 65           | 104          |
| 60                                                 | 1                | 2             |                                           |              |              | 28           |              |              |              | 35           |              |              |              | 48           | 28           |              | 56           | 72           | 29           |              | 58           | 93           |
| 66                                                 | 1                | 2             |                                           |              |              | 26           |              |              |              | 32           |              |              |              | 44           |              |              |              | 65           | 26           |              | 53           | 85           |
| 72                                                 | 1                | 3             |                                           |              |              | 24           |              |              |              | 29           |              |              |              | 40           |              |              |              | 60           | 24           |              | 47           | 78           |
| 78                                                 | 1                | 3             |                                           |              |              |              |              |              |              | 27           |              |              |              | 37           |              |              |              | 55           |              |              |              | 72           |
| 84                                                 | 1                | 3             |                                           |              |              |              |              |              |              |              |              |              |              | 34           |              |              |              | 51           |              |              |              | 67           |
| 90                                                 | 1                | 3             |                                           |              |              |              |              |              |              |              |              |              |              | 32           |              |              |              | 48           |              |              |              | 62           |
| 96                                                 | 1                | 3             |                                           |              |              |              |              |              |              |              |              |              |              | 30           |              |              |              | 45           |              |              |              | 58           |
| 102                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 42           |              |              |              | 55           |
| 108                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 40           |              |              |              | 51           |
| 114                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 46           |
| 120                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 41           |
| 126                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |

\* FOR TRENCH INSTALLATION ONLY

- A = 2-2/3" X 1/2" CORRUGATIONS  
B = 3" X 1" CORRUGATIONS  
C = 5" X 1" CORRUGATIONS  
D = 3/4" X 3/4" X 7-1/2" SPIRAL RIB

(1) MAXIMUM OVERFILL MEASURED FROM THE TOP OF PIPE TO SURFACE.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CORRUGATED METAL PIPE  
INSTALLATION METHODS

DATE EFFECTIVE: 04/01/2011  
DATE PREPARED: 3/22/2022

725.00C

SHEET NO.  
3 OF 5

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| CORRUGATED H34 ALUMINUM CIRCULAR PIPE LOCK SEAM |                  |               |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
|-------------------------------------------------|------------------|---------------|-------------------------------------------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|-------|-----|-----|-----|
| MAXIMUM ALLOWABLE OVERFILL HEIGHTS (1)          |                  |               |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
| SPECIFIED<br>DIAMETER<br>OF PIPE                | MINIMUM<br>COVER |               | SPECIFIED THICKNESS OF COATED SHEET (IN.) |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |
|                                                 | CORRUGATED       | SPIRAL<br>RIB | 0.06                                      |     |     |     | 0.075 |     |     |     | 0.105 |     |     |     | 0.135 |     |     |     | 0.164 |     |     |     |
|                                                 |                  |               | A                                         | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   | A     | B   | C   | D   |
| IN.                                             | FT.              | FT.           | FT.                                       | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. | FT.   | FT. | FT. | FT. |
| 12                                              | 1                | 1             | 159                                       | 183 |     | 85  | 199   | 229 |     | 117 | 278   | 320 |     | 187 | 358   | 428 |     | 265 | 437   | 504 |     |     |
| 15                                              | 1                | 1             | 127                                       | 146 |     | 68  | 159   | 183 |     | 93  | 223   | 256 |     | 150 | 286   | 343 |     | 212 | 350   | 403 |     |     |
| 18                                              | 1                | 1             | 106                                       | 122 |     | 57  | 132   | 153 |     | 78  | 185   | 213 |     | 125 | 239   | 286 |     | 176 | 291   | 336 |     |     |
| 21                                              | 1                | 1             | 91                                        | 104 |     | 49  | 113   | 131 |     | 67  | 159   | 183 |     | 107 | 205   | 245 |     | 151 | 250   | 288 |     |     |
| 24                                              | 1                | 1             | 79                                        | 91  |     | 43  | 99    | 115 |     | 58  | 139   | 160 |     | 94  | 179   | 214 |     | 132 | 218   | 252 |     |     |
| 30                                              | 1                | 2             |                                           | 73  |     | 34  | 79    | 92  |     | 47  | 111   | 128 |     | 75  | 143   | 171 |     | 106 | 175   | 202 |     |     |
| 36                                              | 1                | 2             |                                           | 61  |     | 28* | 66    | 76  |     | 39  | 93    | 107 |     | 62  | 119   | 143 |     | 88  | 146   | 168 |     |     |
| 42                                              | 1                | 2             |                                           | 52  |     |     |       | 66  |     | 33* | 79    | 91  |     | 54  | 102   | 122 |     | 76  | 125   | 144 |     |     |
| 48                                              | 1                | 2             |                                           | 46  |     |     |       | 57  |     |     | 68    | 80  |     | 47  | 89    | 107 |     | 66  | 109   | 126 |     |     |
| 54                                              | 1                | 2             |                                           | 41  |     |     |       | 51  |     |     | 56    | 71  |     | 42  | 73    | 95  |     | 59  | 90    | 112 |     |     |
| 60                                              | 1                | 2             |                                           | 37  |     |     |       | 46  |     |     |       | 64  |     | 37* | 59    | 86  |     | 53  | 73    | 101 |     |     |
| 66                                              | 1                | 2             |                                           | 33  |     |     |       | 42  |     |     |       | 58  |     |     |       | 78  |     | 48  | 59    | 92  |     |     |
| 72                                              | 1                | 3             |                                           | 30  |     |     |       | 38  |     |     |       | 53  |     |     |       | 71  |     | 42* | 47    | 84  |     |     |
| 78                                              | 1                | 3             |                                           |     |     |     |       | 35  |     |     |       | 49  |     |     |       | 66  |     |     |       | 78  |     |     |
| 84                                              | 1                | 3             |                                           |     |     |     |       |     |     |     |       | 46  |     |     |       | 61  |     |     |       | 72  |     |     |
| 90                                              | 1                | 3             |                                           |     |     |     |       |     |     |     |       | 43  |     |     |       | 57  |     |     |       | 67  |     |     |
| 96                                              | 1                | 3             |                                           |     |     |     |       |     |     |     |       | 39  |     |     |       | 53  |     |     |       | 62  |     |     |
| 102                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       | 48  |     |     |       | 56  |     |     |
| 108                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       | 43  |     |     |       | 51  |     |     |
| 114                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       | 46  |     |     |
| 120                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       | 41  |     |     |
| 126                                             | 2                | 4             |                                           |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |       |     |     |     |

| CORRUGATED H34 ALUMINUM CIRCULAR PIPE RIVETED SEAM |                  |               |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
|----------------------------------------------------|------------------|---------------|-------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| MAXIMUM ALLOWABLE OVERFILL HEIGHTS (1)             |                  |               |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
| SPECIFIED<br>DIAMETER<br>OF PIPE                   | MINIMUM<br>COVER |               | SPECIFIED THICKNESS OF COATED SHEET (IN.) |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |
|                                                    | CORRUGATED       | SPIRAL<br>RIB | 0.06                                      |              |              |              | 0.075        |              |              |              | 0.105        |              |              |              | 0.135        |              |              |              | 0.164        |              |              |              |
|                                                    |                  |               | SINGLE RIVET                              | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET | SINGLE RIVET | DOUBLE RIVET |
| IN.                                                | FT.              | FT.           | A                                         | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            | A            | B            |
| 12                                                 | 1                | 1             | 77                                        |              | 120          | 141          | 77           |              | 154          | 175          | 133          |              | 269          | 239          | 138          |              | 282          | 359          | 144          |              | 291          | 466          |
| 15                                                 | 1                | 1             | 62                                        |              | 96           | 113          | 62           |              | 123          | 140          | 107          |              | 215          | 191          | 111          |              | 226          | 287          | 115          |              | 232          | 373          |
| 18                                                 | 1                | 1             | 51                                        |              | 80           | 94           | 51           |              | 103          | 117          | 89           |              | 179          | 160          | 92           |              | 188          | 239          | 96           |              | 194          | 311          |
| 21                                                 | 1                | 1             | 44                                        |              | 68           | 81           | 44           |              | 88           | 100          | 76           |              | 154          | 137          | 79           |              | 161          | 205          | 82           |              | 166          | 266          |
| 24                                                 | 1                | 1             | 38                                        |              | 60           | 71           | 38           |              | 77           | 88           | 67           |              | 135          | 120          | 69           |              | 141          | 179          | 72           |              | 145          | 233          |
| 30                                                 | 1                | 2             |                                           |              |              | 56           | 31           |              | 62           | 70           | 53           |              | 108          | 96           | 55           |              | 113          | 144          | 57           |              | 116          | 186          |
| 36                                                 | 1                | 2             |                                           |              |              | 47           | 26           |              | 51           | 58           | 44           |              | 90           | 80           | 46           |              | 94           | 120          | 48           |              | 97           | 155          |
| 42                                                 | 1                | 2             |                                           |              |              | 40           |              |              |              | 50           | 38           |              | 77           | 68           | 40           |              | 81           | 103          | 41           |              | 83           | 133          |
| 48                                                 | 1                | 2             |                                           |              |              | 35           |              |              |              | 44           | 33           |              | 67           | 60           | 35           |              | 71           | 90           | 36           |              | 73           | 116          |
| 54                                                 | 1                | 2             |                                           |              |              | 31           |              |              |              | 39           | 30           |              | 56           | 53           | 31           |              | 63           | 80           | 32           |              | 65           | 104          |
| 60                                                 | 1                | 2             |                                           |              |              | 28           |              |              |              | 35           |              |              |              | 48           | 28           |              | 56           | 72           | 29           |              | 58           | 93           |
| 66                                                 | 1                | 2             |                                           |              |              | 26           |              |              |              | 32           |              |              |              | 44           |              |              |              | 65           | 26           |              | 53           | 85           |
| 72                                                 | 1                | 3             |                                           |              |              | 24           |              |              |              | 29           |              |              |              | 40           |              |              |              | 60           | 24           |              | 47           | 78           |
| 78                                                 | 1                | 3             |                                           |              |              |              |              |              |              | 27           |              |              |              | 37           |              |              |              | 55           |              |              |              | 72           |
| 84                                                 | 1                | 3             |                                           |              |              |              |              |              |              |              |              |              |              | 34           |              |              |              | 51           |              |              |              | 67           |
| 90                                                 | 1                | 3             |                                           |              |              |              |              |              |              |              |              |              |              | 32           |              |              |              | 48           |              |              |              | 62           |
| 96                                                 | 1                | 3             |                                           |              |              |              |              |              |              |              |              |              |              | 30           |              |              |              | 45           |              |              |              | 58           |
| 102                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 42           |              |              |              | 55           |
| 108                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 40           |              |              |              | 51           |
| 114                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 46           |
| 120                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              | 41           |
| 126                                                | 2                | 4             |                                           |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |

\* FOR TRENCH INSTALLATION ONLY

A = 2-2/3" X 1/2" CORRUGATIONS  
B = 3" X 1" CORRUGATIONS  
C = 5" X 1" CORRUGATIONS  
D = 3/4" X 3/4" X 7-1/2" SPIRAL RIB

(1) MAXIMUM OVERFILL MEASURED FROM THE TOP OF PIPE TO SURFACE.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

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JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

CORRUGATED METAL PIPE  
INSTALLATION METHODS

DATE EFFECTIVE: 04/01/2011  
DATE PREPARED: 3/22/2022

725.00C

SHEET NO.  
4 OF 5

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| MINIMUM COVER FOR CONSTRUCTION LOADS<br>(ROUND AND PIPE-ARCH) |                                                     |                       |                        |                         |
|---------------------------------------------------------------|-----------------------------------------------------|-----------------------|------------------------|-------------------------|
| DIAMETER<br>OR<br>PIPE SPAN                                   | MINIMUM COVER (FT.) FOR<br>INDICATED AXLE LOADS (2) |                       |                        |                         |
|                                                               | 18K LBS.-<br>50K LBS.                               | 50K LBS.-<br>75K LBS. | 75K LBS.-<br>110K LBS. | 110K LBS.-<br>150K LBS. |
| IN.                                                           | FT.                                                 | FT.                   | FT.                    | FT.                     |
| 12-42                                                         | 2.0                                                 | 2.5                   | 3.0                    | 3.0                     |
| 48-72                                                         | 3.0                                                 | 3.0                   | 3.5                    | 4.0                     |
| 78-120                                                        | 3.0                                                 | 3.5                   | 4.0                    | 4.0                     |
| 126-144                                                       | 3.5                                                 | 4.0                   | 4.5                    | 4.5                     |

THE CONTRACTOR SHALL PROVIDE MINIMUM COVER PLUS ANY ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. IN UNPAVED SITUATIONS, THE SURFACE MUST BE MAINTAINED TO A LEVEL AND NON-RUTTED CONDITION.

| PIPE-ARCH REQUIREMENTS<br>2-2/3" X 1/2" CORRUGATIONS |             |             |                    |       |
|------------------------------------------------------|-------------|-------------|--------------------|-------|
| TYPE                                                 | SPAN<br>(3) | RISE<br>(3) | GALVANIZED SHEET   |       |
|                                                      | (IN.)       | (IN.)       | THICKNESS<br>(IN.) | GAUGE |
| B1                                                   | 17          | 13          | 0.064              | 16    |
| B2                                                   | 21          | 15          | 0.064              | 16    |
| B3                                                   | 24          | 18          | 0.064              | 16    |
| B4                                                   | 28          | 20          | 0.064              | 16    |
| B5                                                   | 35          | 24          | 0.064              | 16    |
| B6                                                   | 42          | 29          | 0.079              | 14    |
| B7                                                   | 49          | 33          | 0.109              | 12    |
| B8                                                   | 57          | 38          | 0.109              | 12    |
| B9                                                   | 64          | 43          | 0.109              | 12    |
| B10                                                  | 71          | 47          | 0.138              | 10    |
| B11                                                  | 77          | 52          | 0.168              | 8     |
| B12                                                  | 83          | 57          | 0.168              | 8     |

| PIPE-ARCH REQUIREMENTS |             |             |                                             |       |                                             |       |                      |
|------------------------|-------------|-------------|---------------------------------------------|-------|---------------------------------------------|-------|----------------------|
| TYPE                   | SPAN<br>(4) | RISE<br>(4) | GALVANIZED SHEET<br>3" X 1"<br>CORRUGATIONS |       | GALVANIZED SHEET<br>5" X 1"<br>CORRUGATIONS |       | MINIMUM<br>COVER (2) |
|                        | (IN.)       | (IN.)       | THICKNESS<br>(IN.)                          | GAUGE | THICKNESS<br>(IN.)                          | GAUGE | (IN.)                |
| B8A                    | 53 (-2.4)   | 41 (+2.4)   | 0.079                                       | 14    | 0.109                                       | 12    | 12                   |
| B9A                    | 60 (-2.7)   | 46 (+2.7)   | 0.079                                       | 14    | 0.109                                       | 12    | 15                   |
| B10A                   | 66 (-3.0)   | 51 (+3.0)   | 0.079                                       | 14    | 0.109                                       | 12    | 15                   |
| B11A                   | 73 (-3.3)   | 55 (+3.3)   | 0.079                                       | 14    | 0.109                                       | 12    | 18                   |
| B12A                   | 81 (-3.6)   | 59 (+3.6)   | 0.079                                       | 14    | 0.109                                       | 12    | 18                   |
| B13A                   | 87 (-4.4)   | 63 (+4.4)   | 0.079                                       | 14    | 0.109                                       | 12    | 18                   |
| B14A                   | 95 (-4.8)   | 67 (+4.8)   | 0.079                                       | 14    | 0.109                                       | 12    | 18                   |
| B15A                   | 103 (-5.2)  | 71 (+5.2)   | 0.079                                       | 14    | 0.109                                       | 12    | 18                   |
| B16A                   | 112 (-5.6)  | 75 (+5.6)   | 0.109                                       | 12    | 0.109                                       | 12    | 21                   |
| B17A                   | 117 (-5.9)  | 79 (+5.9)   | 0.109                                       | 12    | 0.109                                       | 12    | 21                   |
| B18A                   | 128 (-6.4)  | 83 (+6.4)   | 0.109                                       | 12    | 0.109                                       | 12    | 24                   |
| B19A                   | 137 (-6.9)  | 87 (+6.9)   | 0.109                                       | 12    | 0.109                                       | 12    | 24                   |
| B20A                   | 142 (-7.1)  | 91 (+7.1)   | 0.138                                       | 10    | 0.138                                       | 10    | 24                   |

- (2) MINIMUM COVER MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT.
- (3) A TOLERANCE OF PLUS OR MINUS ONE INCH OR 2 PERCENT OF EQUIVALENT CIRCULAR DIAMETER, WHICHEVER IS GREATER, WILL BE PERMISSIBLE IN SPAN AND RISE.
- (4) TOLERANCES IN PARENTHESES. NO TOLERANCE IN OPPOSITE DIRECTION.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

ERIC E.  
SCHROETER

NUMBER  
PE-28411

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

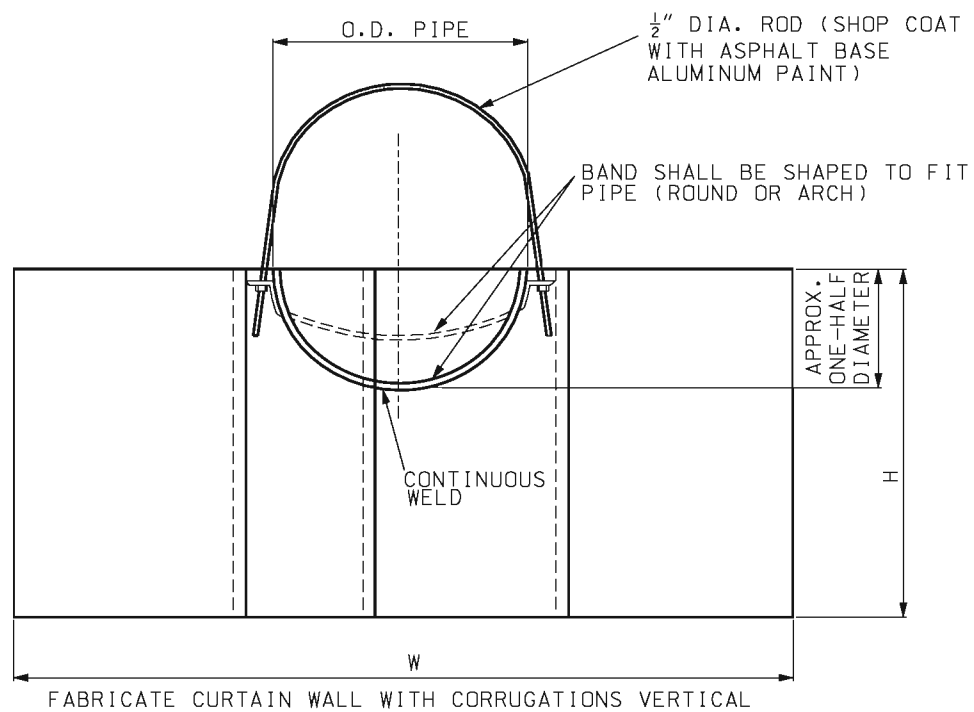
CORRUGATED METAL PIPE  
INSTALLATION METHODS

DATE EFFECTIVE: 04/01/2011  
DATE PREPARED: 8/24/2015

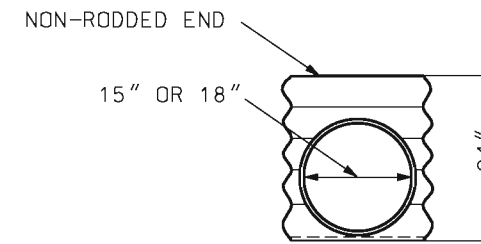
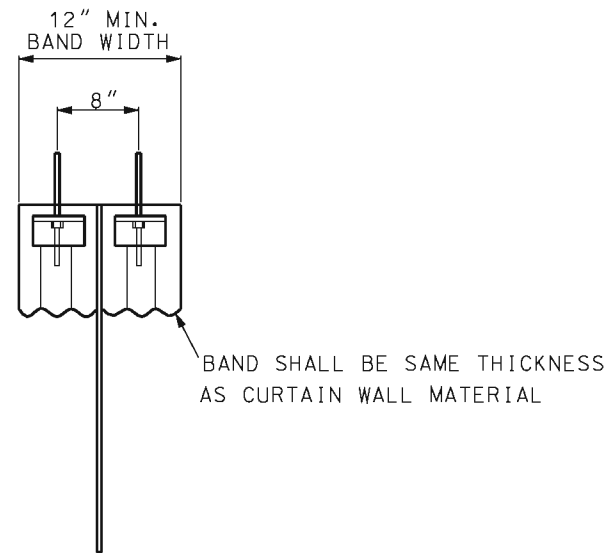
725.00C

SHEET NO.  
5 OF 5

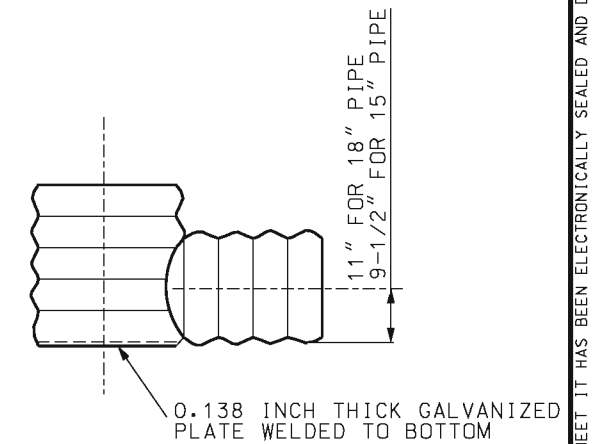
IF A SEAL IS PRESENT ON THIS SHEET, IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



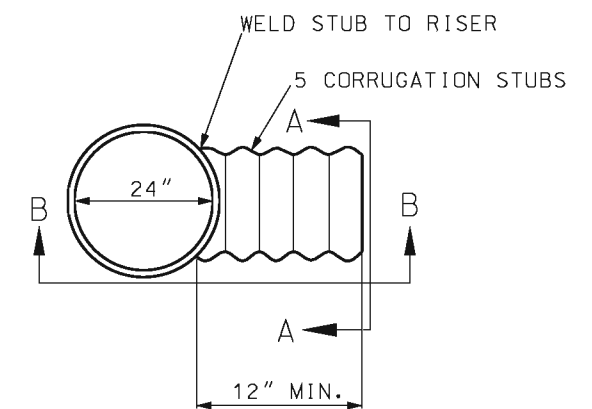
**METAL CURTAIN WALL**



**SECTION A-A**



**SECTION B-B**



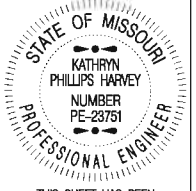
**PLAN  
METAL INLETS**

**TABLE FOR METAL  
CURTAIN WALL**

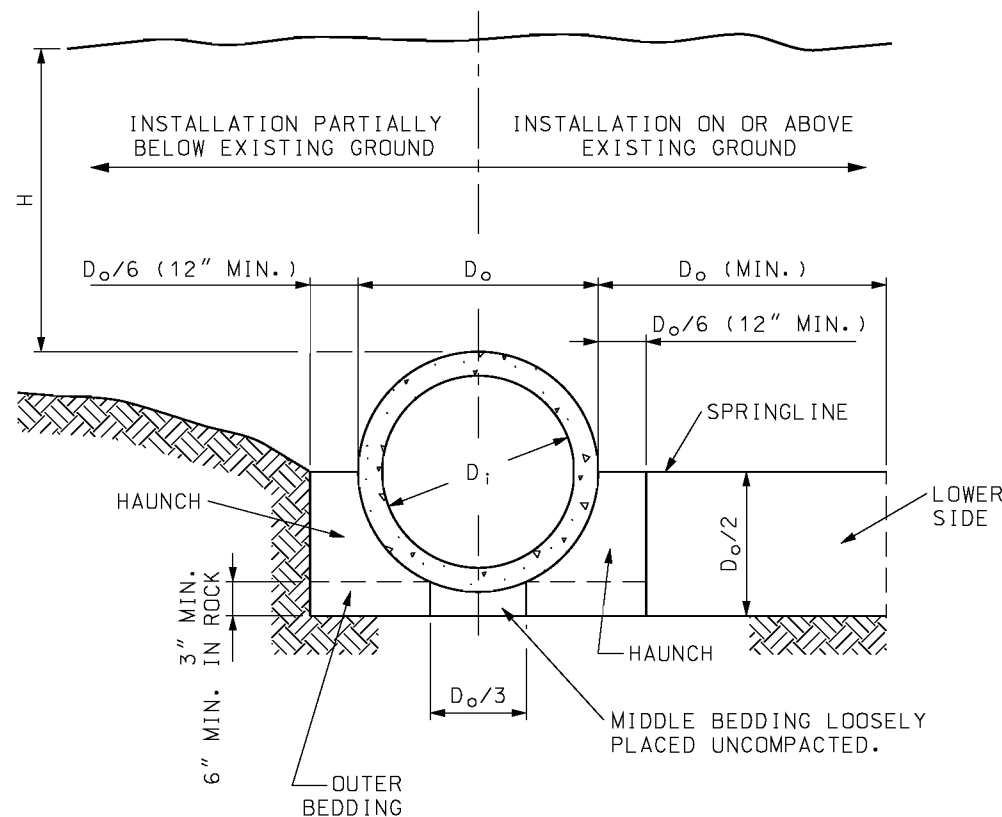
| FOR ROUND OR ELLIPTICAL PIPE |                         |          |          |
|------------------------------|-------------------------|----------|----------|
| DIA.<br>IN.                  | GALV. SHT.<br>THICK IN. | W<br>IN. | H<br>IN. |
| 18                           | 0.064                   | 72       | 35       |
| 21                           | 0.064                   | 72       | 35       |
| 24                           | 0.064                   | 72       | 40       |
| 30                           | 0.064                   | 84       | 40       |
| 36                           | 0.079                   | 84       | 49       |
| 42                           | 0.079                   | 96       | 49       |
| 48                           | 0.079                   | 96       | 49       |
| 54                           | 0.079                   | 120      | 58-1/2   |
| 60                           | 0.109                   | 120      | 58-1/2   |
| 66                           | 0.109                   | 132      | 58-1/2   |
| 72                           | 0.109                   | 132      | 68-1/2   |
| 78                           | 0.138                   | 132      | 68-1/2   |
| 84                           | 0.138                   | 144      | 68-1/2   |

| FOR PIPE ARCH |       |     |    |
|---------------|-------|-----|----|
| B-2           | 0.064 | 72  | 30 |
| B-3           | 0.064 | 72  | 30 |
| B-4           | 0.079 | 84  | 30 |
| B-5           | 0.079 | 84  | 30 |
| B-6           | 0.109 | 96  | 35 |
| B-7           | 0.109 | 96  | 35 |
| B-8           | 0.109 | 108 | 35 |
| B-9           | 0.109 | 120 | 35 |
| B-10          | 0.138 | 120 | 40 |
| B-11          | 0.168 | 125 | 50 |
| B-12          | 0.168 | 131 | 54 |

GENERAL NOTES:

|                                                                                                                                                                                                                                                                      |                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>                        |                                                       |
|  <p>STATE OF MISSOURI<br/>KATHRYN PHILLIPS HARVEY<br/>NUMBER PE-23751<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p><b>METAL CURTAIN WALL<br/>AND METAL INLETS</b></p> |
| <p>DATE EFFECTIVE: 07/01/2004<br/>DATE PREPARED: 8/21/2009</p>                                                                                                                                                                                                       | <p><b>725.31C</b></p>                                 |
| <p>SHEET NO.<br/>1 OF 1</p>                                                                                                                                                                                                                                          |                                                       |

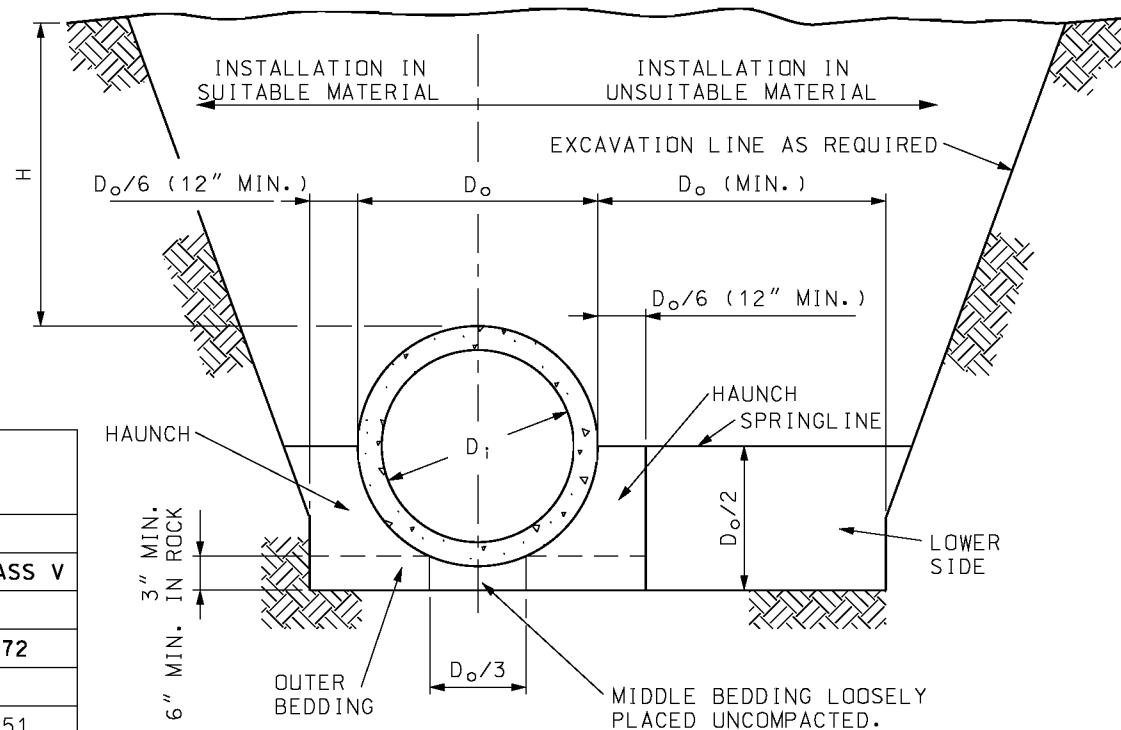




EMBANKMENT INSTALLATIONS

- CONSTRUCTION SEQUENCE
1. PLACE BEDDING MATERIAL TO GRADE. DO NOT COMPACT.
  2. INSTALL PIPE TO GRADE.
  3. COMPACT BEDDING OUTSIDE THE MIDDLE THIRD OF THE PIPE.
  4. PLACE AND COMPACT THE HAUNCH AREA UP TO THE SPRINGLINE.
  5. COMPLETE BACKFILL ACCORDING TO SPECIFICATIONS.

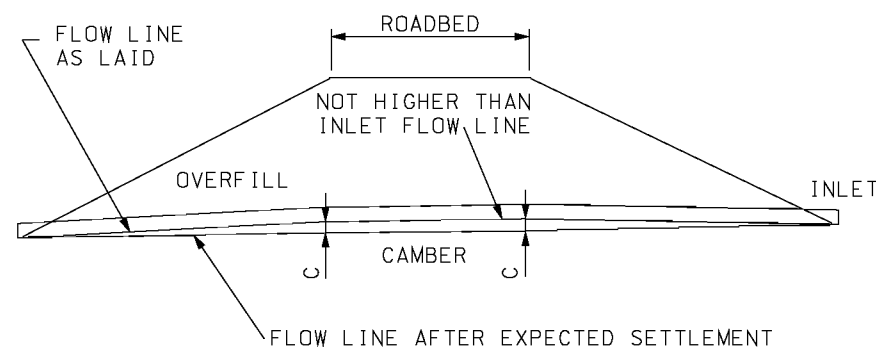
| MAXIMUM DIAMETER AND MAXIMUM FILL HEIGHT |                                                                                                                                                                                                                                                            |          |           |          |         |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|----------|---------|
| INSTALLATION TYPE                        | CLASS OF PIPE                                                                                                                                                                                                                                              |          |           |          |         |
|                                          | CLASS I                                                                                                                                                                                                                                                    | CLASS II | CLASS III | CLASS IV | CLASS V |
|                                          | MAXIMUM DIAMETER (INCHES)                                                                                                                                                                                                                                  |          |           |          |         |
|                                          | 108                                                                                                                                                                                                                                                        | 108      | 108       | 84       | 72      |
| TYPE 1                                   | MAXIMUM FILL HEIGHT IN (FEET)                                                                                                                                                                                                                              |          |           |          |         |
|                                          | 12                                                                                                                                                                                                                                                         | 15       | 21        | 33       | 51      |
|                                          | 9                                                                                                                                                                                                                                                          | 12       | 17        | 26       | 39      |
|                                          | 7                                                                                                                                                                                                                                                          | 9        | 13        | 20       | 30      |
| TYPE 4                                   | 4                                                                                                                                                                                                                                                          | 6        | 9         | 13       | 20      |
|                                          | IF FILL HEIGHT EXCEEDS 51 FEET AND PIPE DIAMETER IS 36 INCHES OR LESS A SPECIAL PIPE DESIGN AND INSTALLATION PROCEDURE SHALL BE REQUIRED. IF FILL HEIGHT EXCEEDS 51 FEET AND PIPE DIAMETER IS GREATER THAN 36 INCHES A SPECIAL DESIGN PIPE IS NOT ALLOWED. |          |           |          |         |



TRENCH INSTALLATION

- LEGEND -

- $D_i$  = NORMAL INSIDE DIAMETER OF PIPE.  
 $D_o$  = OUTSIDE DIAMETER OF PIPE.  
 $H$  = FILL COVER HEIGHT OVER PIPE (FEET)  
MIN. = MINIMUM  
 = UNDISTURBED SOIL



NOTE:  
ON YIELDING SOIL, PIPE CULVERTS SHALL BE PLACED ON A CAMBERED FLOW LINE. THE AMOUNT OF CAMBER WILL VARY WITH SOIL CONDITION AND SHALL BE SPECIFIED ON THE DESIGN PLANS.

TYPICAL CAMBERED FLOW LINE

| BEDDING AND COMPACTION REQUIREMENTS |                                                                                                 |                                                   |                        |                     |                        |                        |                     |
|-------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------|---------------------|------------------------|------------------------|---------------------|
| INSTALLATION TYPE                   | BEDDING THICKNESS                                                                               | COMPACTION REQUIREMENTS (MIN. STANDARD PROCTOR %) |                        |                     |                        |                        |                     |
|                                     |                                                                                                 | HAUNCH AND OUTER BEDDING                          |                        |                     | LOWER SIDE BEDDING     |                        |                     |
|                                     |                                                                                                 | CATEGORY 1 SOIL (A)                               | CATEGORY 2 SOIL (B)    | CATEGORY 3 SOIL (C) | CATEGORY 1 SOIL (A)    | CATEGORY 2 SOIL (B)    | CATEGORY 3 SOIL (C) |
| 1                                   | $D_o/24$ MINIMUM, NOT LESS THAN 3". IF ROCK FOUNDATION, USE $D_o/12$ MINIMUM, NOT LESS THAN 6". | 95                                                | N/A                    | N/A                 | 90                     | 95                     | 100                 |
| 2                                   | $D_o/24$ MINIMUM, NOT LESS THAN 3". IF ROCK FOUNDATION, USE $D_o/12$ MINIMUM, NOT LESS THAN 6". | 90                                                | 95                     | N/A                 | 85                     | 90                     | 95                  |
| 3                                   | $D_o/24$ MINIMUM, NOT LESS THAN 3". IF ROCK FOUNDATION, USE $D_o/12$ MINIMUM, NOT LESS THAN 6". | 85                                                | 90                     | 95                  | 85                     | 90                     | 95                  |
| 4                                   | $D_o/24$ MINIMUM, NOT LESS THAN 3". IF ROCK FOUNDATION, USE $D_o/12$ MINIMUM, NOT LESS THAN 6". | NO COMPACTION REQUIRED                            | NO COMPACTION REQUIRED | 85                  | NO COMPACTION REQUIRED | NO COMPACTION REQUIRED | 85                  |

- (A) GRAVELLY SAND  
(B) SANDY-SILT  
(C) SILTY CLAY

GENERAL NOTES:

MULTIPLE PIPE CULVERTS SHALL BE INSTALLED WITH A MINIMUM CLEARANCE BETWEEN PIPES OF  $\frac{1}{2} D_o$  OR 12", WHICHEVER IS GREATER, BUT NOT TO EXCEED 36".

CLASS I AND CLASS II REINFORCED CONCRETE PIPE SHALL ONLY BE USED FOR SEWERS IN TRENCHES OUTSIDE ROADBED AND STREET LIMITS.

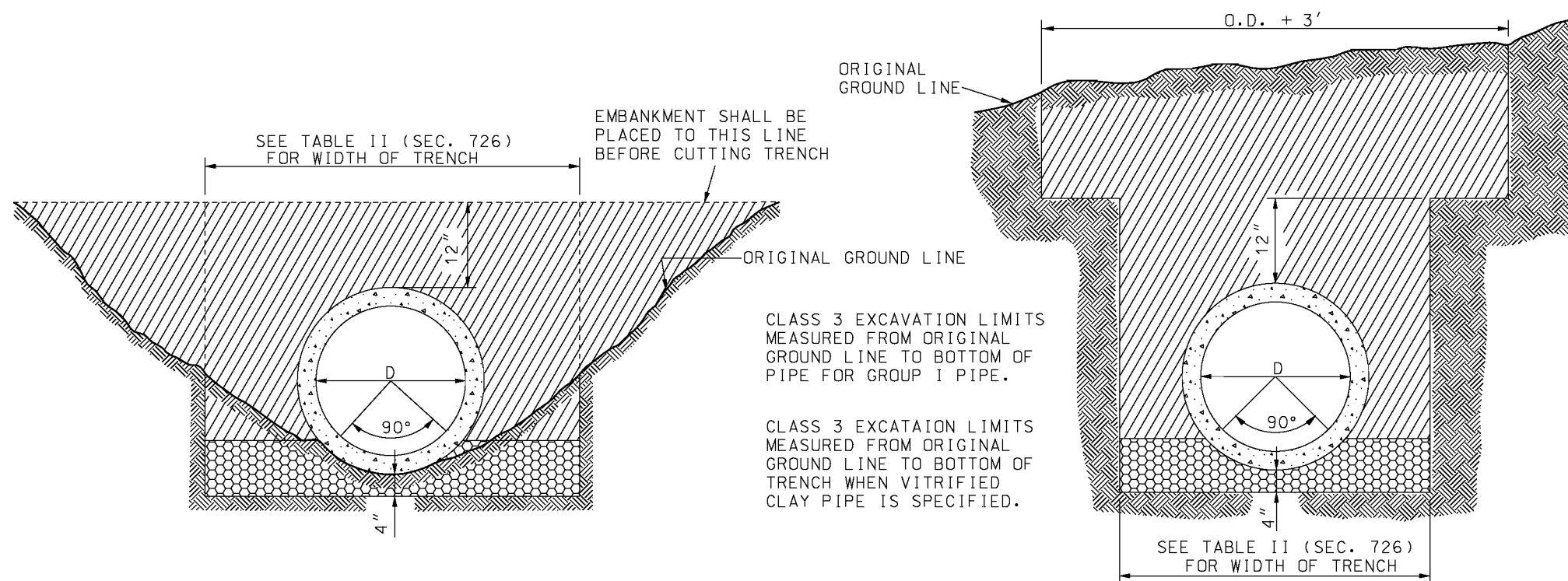
**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**RIGID CULVERT INSTALLATION METHODS**  
REINFORCED CONCRETE PIPE CULVERTS

DATE EFFECTIVE: 04/01/2015  
DATE PREPARED: 2/20/2015

**726.30J**

SHEET NO.  
1 OF 2



### LEGEND

- COMPACTED ROADWAY EMBANKMENT
- SUITABLE BACKFILL
- LOOSE DRY MATERIAL
- COMPACTED SAND

### EXTRA STRENGTH

### STANDARD STRENGTH

| HEIGHT OF FILL OVER V.C. PIPE CULVERTS |                                                            |                                     |                                     |                                                            |                                     |                                     |
|----------------------------------------|------------------------------------------------------------|-------------------------------------|-------------------------------------|------------------------------------------------------------|-------------------------------------|-------------------------------------|
| NOMINAL<br>PIPE<br>DIAMETER<br>(INCH)  | STANDARD STRENGTH                                          |                                     |                                     | EXTRA STRENGTH                                             |                                     |                                     |
|                                        | TRENCH WIDTH<br>AT ONE FOOT<br>ABOVE TOP OF<br>PIPE (FEET) | MINIMUM<br>FILL<br>HEIGHT<br>(FEET) | MAXIMUM<br>FILL<br>HEIGHT<br>(FEET) | TRENCH WIDTH<br>AT ONE FOOT<br>ABOVE TOP OF<br>PIPE (FEET) | MINIMUM<br>FILL<br>HEIGHT<br>(FEET) | MAXIMUM<br>FILL<br>HEIGHT<br>(FEET) |
| 6                                      | 2.0                                                        | 1.0                                 | 9.0                                 |                                                            |                                     |                                     |
| 8                                      | 2.0                                                        | 1.0                                 | 7.0                                 | 2.5                                                        | 4.0                                 | 12.0                                |
| 10                                     | 2.5                                                        | 1.0                                 | 7.0                                 | 2.5                                                        | 4.0                                 | 12.0                                |
| 12                                     | 2.7                                                        | 1.0                                 | 6.0                                 | 3.0                                                        | 4.0                                 | 13.0                                |
| 15                                     | 3.5                                                        | 1.0                                 | 6.0                                 | 3.0                                                        | 4.0                                 | 17.0                                |
| 18                                     | 3.5                                                        | 1.0                                 | 6.0                                 | 3.5                                                        | 4.0                                 | 17.0                                |
| 21                                     | 4.0                                                        | 1.0                                 | 6.0                                 | 4.0                                                        | 4.0                                 | 17.0                                |
| 24                                     | 4.0                                                        | 1.0                                 | 8.0                                 | 4.0                                                        | 3.0                                 | 19.0                                |
| 30                                     | 4.5                                                        | 1.0                                 | 10.0                                | 4.5                                                        | 3.0                                 | 19.0                                |
| 36                                     | 5.0                                                        | 1.0                                 | 11.0                                | 5.0                                                        | 3.0                                 | 19.0                                |



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**RIGID CULVERT  
INSTALLATION METHODS**

VITRIFIED CLAY  
PIPE CULVERTS



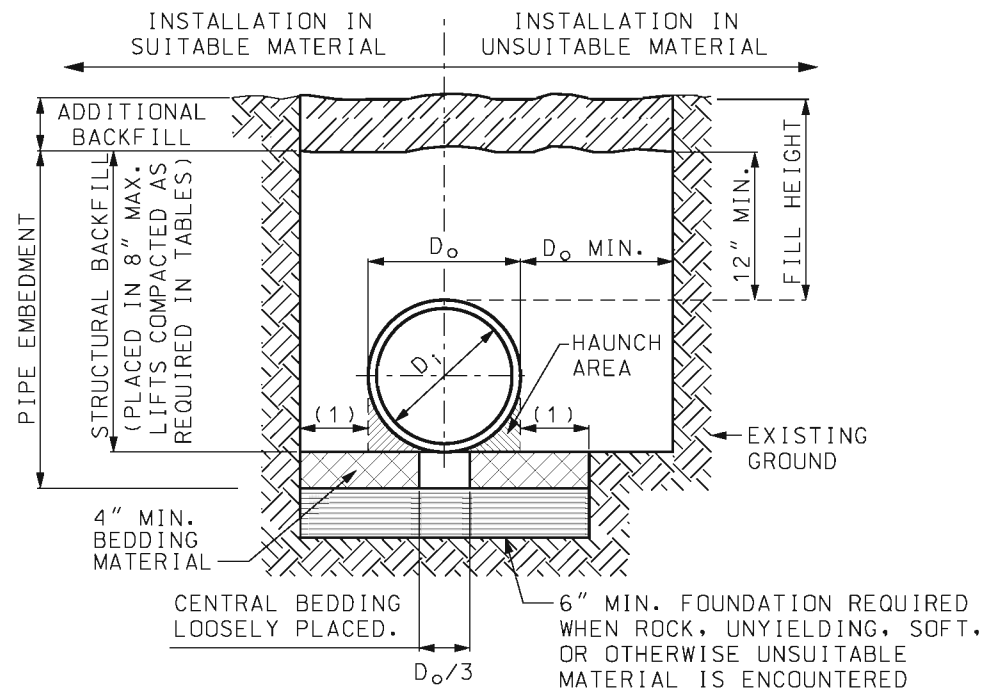
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

DATE EFFECTIVE: 04/01/2015

DATE PREPARED: 2/20/2015

**726.30J**

SHEET NO.  
2 OF 2

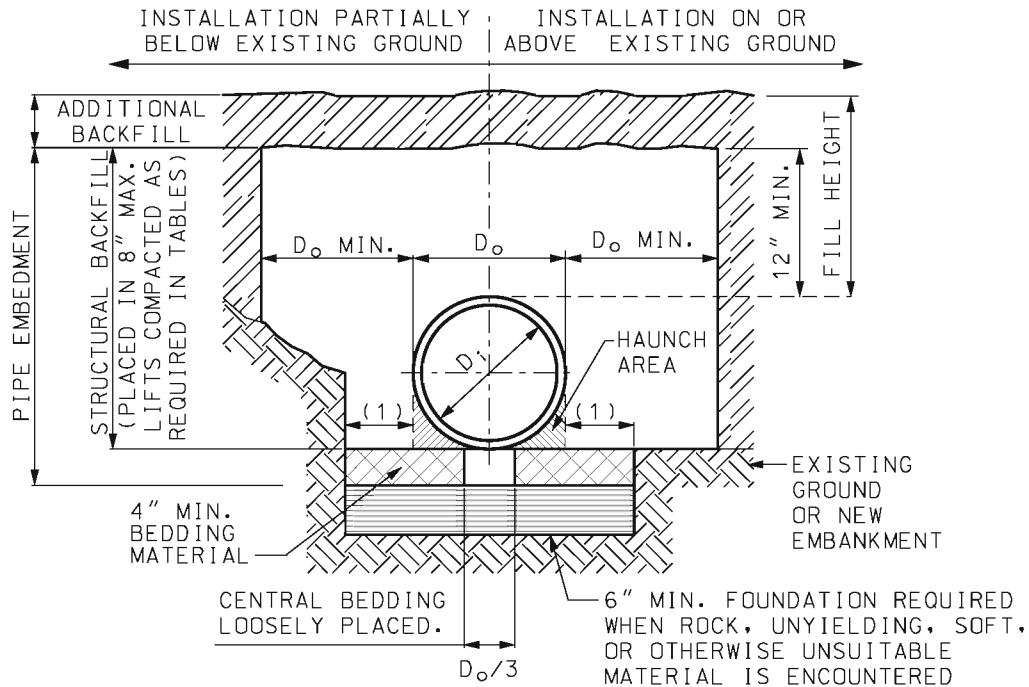


## TRENCH INSTALLATION

### LEGEND

$D_i$  = INSIDE DIAMETER OF PIPE.  
 $D_o$  = OUTSIDE DIAMETER OF PIPE.  
(1) =  $(D_o/4)+6"$  (MIN.)

NOTE:  
MULTIPLE PIPE SHALL BE INSTALLED WITH A MINIMUM CLEARANCE BETWEEN PIPES OF  $\frac{1}{2} D_o$  OR 12", WHICHEVER IS GREATER, BUT NOT TO EXCEED 36".



## EMBANKMENT INSTALLATION

### CONSTRUCTION SEQUENCE

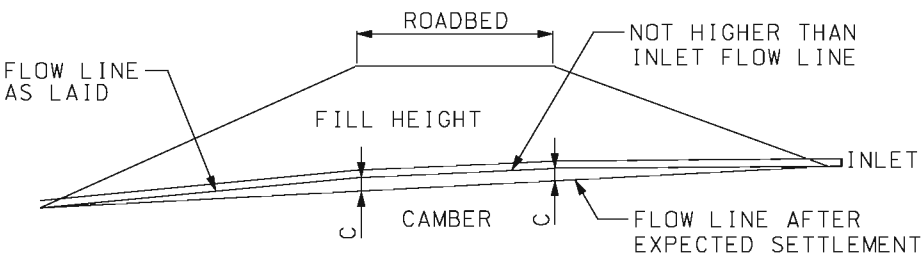
1. PLACE BEDDING MATERIAL TO GRADE.
2. COMPACT BEDDING OUTSIDE THE MIDDLE THIRD OF THE PIPE.
3. INSTALL PIPE TO GRADE.
4. COMPLETE STRUCTURAL BACKFILL ACCORDING TO SPECIFICATIONS.

| FILL HEIGHT LIMITS                                                            |                                     |                    |      |                    |      |                               |      |                    |      |                    |      |                           |      |                    |      |                           |      |                    |      |
|-------------------------------------------------------------------------------|-------------------------------------|--------------------|------|--------------------|------|-------------------------------|------|--------------------|------|--------------------|------|---------------------------|------|--------------------|------|---------------------------|------|--------------------|------|
| STRUCTURAL BACKFILL                                                           | SPECIFIED NOMINAL DIA OF PIPE (IN.) | POLYETHYLENE       |      |                    |      | STEEL REINFORCED POLYETHYLENE |      | POLYVINYL          |      |                    |      | DOUBLE WALL POLYPROPYLENE |      |                    |      | TRIPLE WALL POLYPROPYLENE |      |                    |      |
|                                                                               |                                     | COMPACTION 90% SPD |      | COMPACTION 95% SPD |      | COMPACTION 90% SPD            |      | COMPACTION 90% SPD |      | COMPACTION 95% SPD |      | COMPACTION 90% SPD        |      | COMPACTION 95% SPD |      | COMPACTION 90% SPD        |      | COMPACTION 95% SPD |      |
|                                                                               |                                     | MIN.               | MAX. | MIN.               | MAX. | MIN.                          | MAX. | MIN.               | MAX. | MIN.               | MAX. | MIN.                      | MAX. | MIN.               | MAX. | MIN.                      | MAX. | MIN.               | MAX. |
| GRAVEL<br>(AASHTO M145 SOIL<br>TYPE A1 & A3)                                  | 12                                  | 2'                 | 19'  | 2'                 | 26'  | --                            | --   | 2'                 | 32'  | 2'                 | 61'  | 2'                        | 21'  | 2'                 | 29'  | --                        | --   | --                 | --   |
|                                                                               | 15                                  | 2'                 | 19'  | 2'                 | 27'  | --                            | --   | 2'                 | 32'  | 2'                 | 55'  | 2'                        | 22'  | 2'                 | 31'  | --                        | --   | --                 | --   |
|                                                                               | 18                                  | 2'                 | 17'  | 2'                 | 25'  | --                            | --   | 2'                 | 31'  | 2'                 | 60'  | 2'                        | 19'  | 2'                 | 27'  | --                        | --   | --                 | --   |
|                                                                               | 24                                  | 2'                 | 15'  | 2'                 | 21'  | 2'                            | 50'  | 2'                 | 30'  | 2'                 | 54'  | 2'                        | 16'  | 2'                 | 22'  | --                        | --   | --                 | --   |
|                                                                               | 30                                  | 2'                 | 17'  | 2'                 | 24'  | 2'                            | 50'  | 2'                 | 31'  | 2'                 | 52'  | 2'                        | 11'  | 2'                 | 15'  | 2'                        | 17'  | 2'                 | 23'  |
|                                                                               | 36                                  | 2'                 | 13'  | 2'                 | 19'  | 2'                            | 50'  | 2'                 | 30'  | 2'                 | 53'  | --                        | --   | --                 | --   | 2'                        | 15'  | 2'                 | 21'  |
|                                                                               | 42                                  | 2'                 | 13'  | 2'                 | 19'  | 2'                            | 50'  | --                 | --   | --                 | --   | --                        | --   | --                 | --   | 2'                        | 19'  | 2'                 | 27'  |
|                                                                               | 48                                  | 2'                 | 12'  | 2'                 | 18'  | 2'                            | 30'  | --                 | --   | --                 | --   | --                        | --   | --                 | --   | 2'                        | 12'  | 2'                 | 17'  |
| 60                                                                            | 2'                                  | 13'                | 2'   | 20'                | 2'   | 30'                           | --   | --                 | --   | --                 | --   | --                        | --   | --                 | 2'   | 16'                       | 2'   | 23'                |      |
| COURSE SAND<br>(AASHTO M145 SOIL<br>TYPE A-1-b)                               | 12                                  | 2'                 | 17'  | 2'                 | 23'  | --                            | --   | 2'                 | 32'  | 2'                 | 55'  | 2'                        | 18'  | 2'                 | 24'  | --                        | --   | --                 | --   |
|                                                                               | 15                                  | 2'                 | 16'  | 2'                 | 22'  | --                            | --   | 2'                 | 32'  | 2'                 | 49'  | 2'                        | 22'  | 2'                 | 31'  | --                        | --   | --                 | --   |
|                                                                               | 18                                  | 2'                 | 15'  | 2'                 | 21'  | --                            | --   | 2'                 | 31'  | 2'                 | 53'  | 2'                        | 16'  | 2'                 | 21'  | --                        | --   | --                 | --   |
|                                                                               | 24                                  | 2'                 | 14'  | 2'                 | 20'  | 2'                            | 50'  | 2'                 | 30'  | 2'                 | 48'  | 2'                        | 13'  | 2'                 | 17'  | --                        | --   | --                 | --   |
|                                                                               | 30                                  | 2'                 | 13'  | 2'                 | 19'  | 2'                            | 50'  | 2'                 | 31'  | 2'                 | 46'  | 2'                        | 7'   | 2'                 | 10'  | 2'                        | 17'  | 2'                 | 23'  |
|                                                                               | 36                                  | 2'                 | 12'  | 2'                 | 17'  | 2'                            | 50'  | 2'                 | 30'  | 2'                 | 46'  | --                        | --   | --                 | --   | 2'                        | 15'  | 2'                 | 21'  |
|                                                                               | 42                                  | 2'                 | 13'  | 2'                 | 18'  | 2'                            | 50'  | --                 | --   | --                 | --   | --                        | --   | --                 | --   | 2'                        | 19'  | 2'                 | 27'  |
|                                                                               | 48                                  | 2'                 | 12'  | 2'                 | 17'  | 2'                            | 30'  | --                 | --   | --                 | --   | --                        | --   | --                 | --   | 2'                        | 12'  | 2'                 | 17'  |
| 60                                                                            | 2'                                  | 13'                | 2'   | 20'                | 2'   | 30'                           | --   | --                 | --   | --                 | --   | --                        | --   | --                 | 2'   | 16'                       | 2'   | 23'                |      |
| SILTY SAND OR<br>SILTY GRAVEL<br>(AASHTO M145 SOIL<br>TYPES A-2-4<br>& A-2-5) | 12                                  | 3.3'               | 10'  | 2'                 | 17'  | --                            | --   | 2.7'               | 16'  | 2'                 | 33'  | 2.8'                      | 11'  | 2'                 | 19'  | --                        | --   | --                 | --   |
|                                                                               | 15                                  | 3.4'               | 10'  | 2'                 | 16'  | --                            | --   | 2.7'               | 16'  | 2'                 | 33'  | 2.8'                      | 11'  | 2'                 | 23'  | --                        | --   | --                 | --   |
|                                                                               | 18                                  | 3.6'               | 10'  | 2'                 | 15'  | --                            | --   | 2.7'               | 15'  | 2'                 | 32'  | 3'                        | 11'  | 2'                 | 16'  | --                        | --   | --                 | --   |
|                                                                               | 24                                  | 3.8'               | 9'   | 2'                 | 14'  | 2'                            | 50'  | 2.7'               | 15'  | 2'                 | 31'  | 3.3'                      | 10'  | 2'                 | 13'  | --                        | --   | --                 | --   |
|                                                                               | 30                                  | 3.7'               | 10'  | 2'                 | 14'  | 2'                            | 50'  | 2.8'               | 15'  | 2'                 | 31'  | 3.4'                      | 6'   | 2'                 | 7'   | 3'                        | 10'  | 2'                 | 17'  |
|                                                                               | 36                                  | 4.2'               | 7'   | 2'                 | 12'  | 2'                            | 50'  | 2.8'               | 14'  | 2'                 | 31'  | --                        | --   | --                 | --   | 3.3'                      | 10'  | 2'                 | 15'  |
|                                                                               | 42                                  | 4.2'               | 7'   | 2'                 | 13'  | 2'                            | 50'  | --                 | --   | --                 | --   | --                        | --   | --                 | --   | 3.2'                      | 11'  | 2'                 | 20'  |
|                                                                               | 48                                  | 4.5'               | 6'   | 2'                 | 12'  | 2'                            | 30'  | --                 | --   | --                 | --   | --                        | --   | --                 | --   | 3.1'                      | 9'   | 2'                 | 13'  |
| 60                                                                            | 3.3'                                | 7'                 | 2'   | 14'                | 2'   | 30'                           | --   | --                 | --   | --                 | --   | --                        | --   | --                 | 2'   | 10'                       | 2'   | 17'                |      |

### MINIMUM COVER FOR CONSTRUCTION LOADS

| NOMINAL PIPE DIA. (IN.) | MINIMUM COVER (FT) FOR INDICATED AXLE LOADS (THOUSANDS OF POUNDS) |       |        |         |
|-------------------------|-------------------------------------------------------------------|-------|--------|---------|
|                         | 18-50                                                             | 50-75 | 75-110 | 110-150 |
| 12-36                   | 2.0                                                               | 2.5   | 3.0    | 3.0     |
| 42-60                   | 3.0                                                               | 3.0   | 3.5    | 4.0     |

MINIMUM COVER LIMITS ARE NOT SUFFICIENT FOR SILTY SAND OR SILTY GRAVEL STRUCTURAL BACKFILL COMPACTED TO 90% STANDARD PROCTOR DENSITY. THE CONTRACTOR SHALL PROVIDE MINIMUM COVER PLUS ANY ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. IN UNPAVED SITUATIONS, THE SURFACE MUST BE MAINTAINED TO A LEVEL AND NON-RUTTED CONDITION.



NOTE:  
ON YIELDING SOIL, PIPE CULVERTS SHALL BE PLACED ON A CAMBERED FLOW LINE. THE AMOUNT OF CAMBER WILL VARY WITH SOIL CONDITION AND WILL BE SPECIFIED ON THE DESIGN PLANS.

## TYPICAL CAMBERED FLOW LINE

NOTE:

SPD = STANDARD PROCTOR DENSITY.

FILL HEIGHT MEASURED FROM THE TOP OF PIPE TO SURFACE.

LIMITS ACCOUNT FOR SHORT-TERM TEMPORARY WATER TABLE DEPTHS OF FIVE FEET ABOVE SPRINGLINE. TABLES ARE NOT APPLICABLE FOR LONG-TERM PERMANENT WATER TABLE DEPTHS ABOVE SPRINGLINE.

WHEN PIPES ARE USED AS GROUP A, FILL HEIGHTS ARE LIMITED TO SHADED VALUES.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

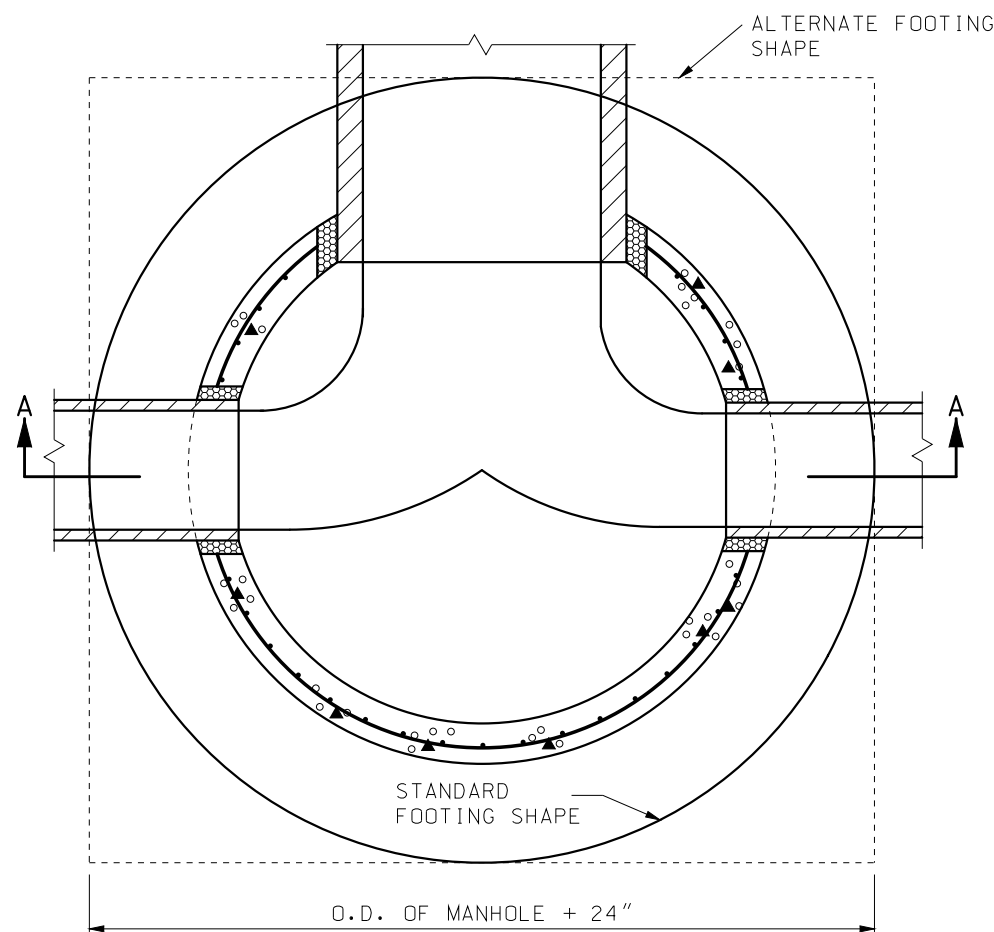
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
ERIC E. SCHROETER  
NUMBER PE-28411  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

## THERMOPLASTIC PIPE INSTALLATION METHODS

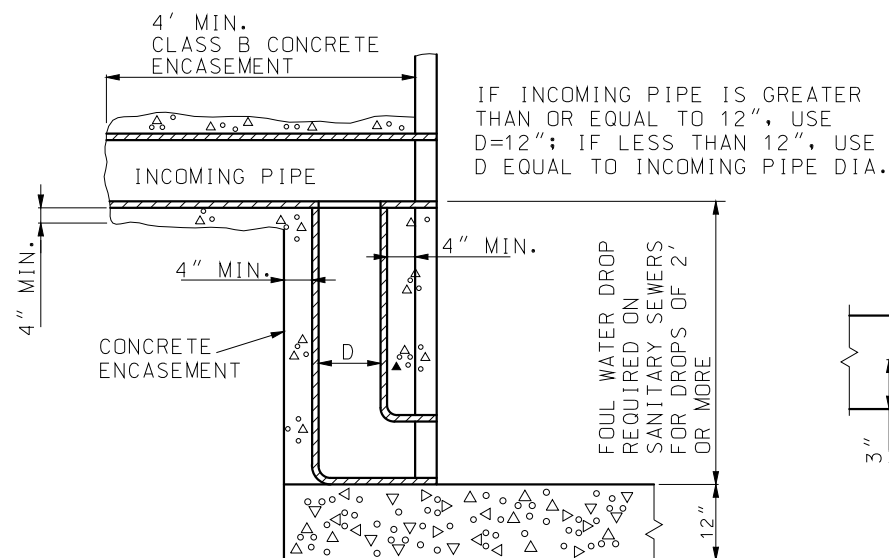
|                 |            |         |                     |
|-----------------|------------|---------|---------------------|
| DATE EFFECTIVE: | 04/01/2015 | 730.00E | SHEET NO.<br>1 OF 1 |
| DATE PREPARED:  | 2/27/2015  |         |                     |



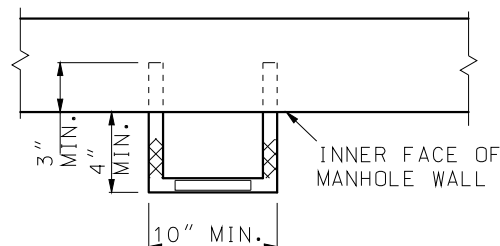
PLAN OF FOOTING

| BASE SECTION DIMENSIONS* |           |
|--------------------------|-----------|
| SIZE OF PIPE             | MIN. DIA. |
| 24" OR SMALLER           | 48"       |
| 30" - 36"                | 60"       |
| 42" - 48"                | 72"       |

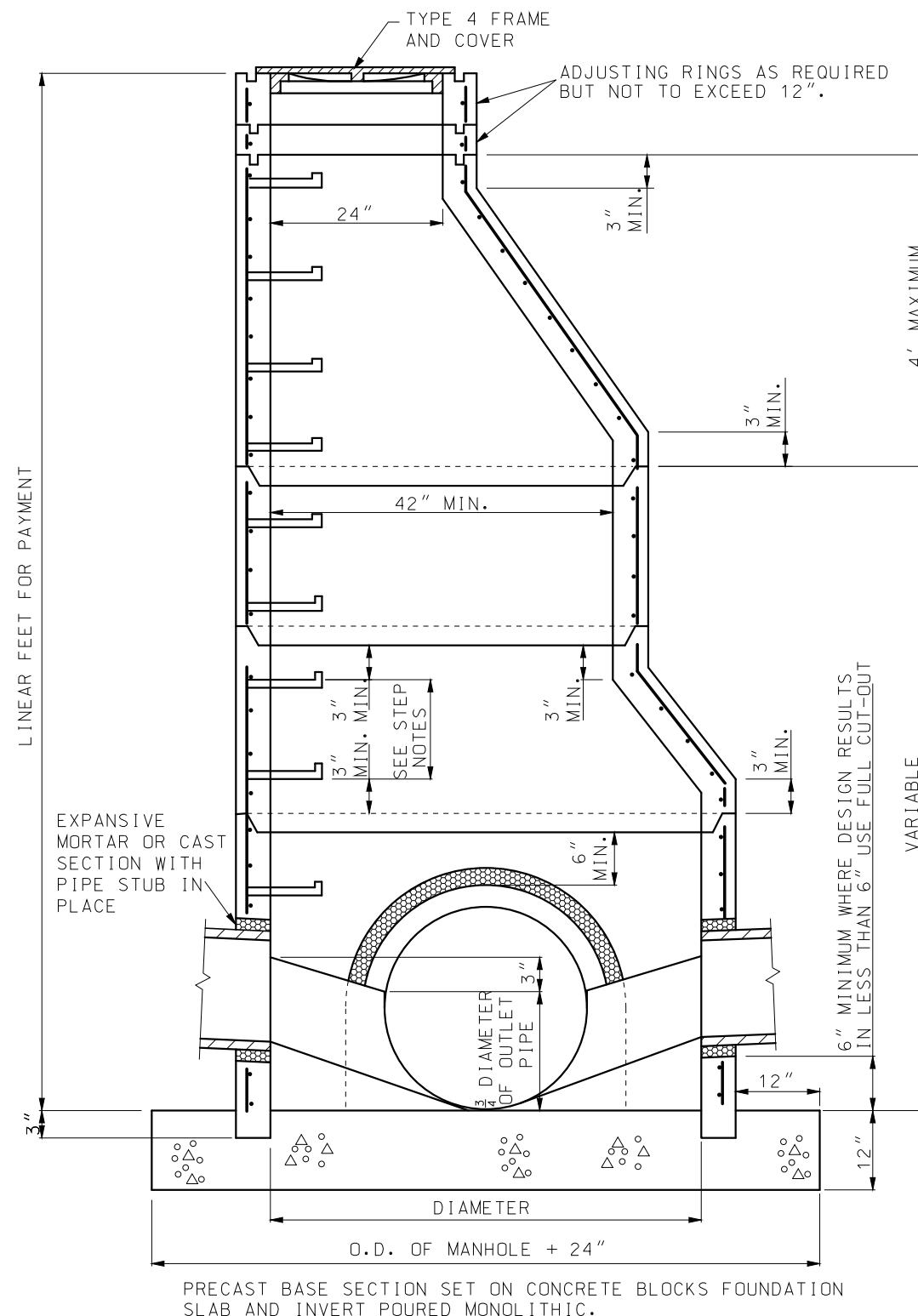
\* RISER SECTIONS SHALL NOT BE LESS THAN 42" DIAMETER.



FOUL WATER DROP



STEP INSTALLATION



SECTION A-A

STEPS SHALL BE PLACED AT VERTICAL INTERVALS OF 16" MAXIMUM IN ALL MANHOLES HAVING A DEPTH OF MORE THAN 4'. STEPS SHALL BEGIN AT AN ELEVATION 6" ABOVE THE TOP OF THE OUTLET PIPE.

STEPS SHALL BE LEVEL AND IN VERTICAL ALIGNMENT.

NO DIRECT PAYMENT WILL BE MADE FOR MANHOLE STEPS.

# GENERAL NOTES:

THE CONTRACTOR WILL BE PERMITTED TO CAST IN PLACE THE MANHOLES, IN ACCORDANCE WITH THE CONCRETE MANHOLE STANDARD.

IF THE CONTRACTOR ELECTS TO CAST IN PLACE THE MANHOLES, PAYMENT WILL BE MADE AT THE CONTRACT UNIT PRICE FOR PRECAST MANHOLES.

THE CONFIGURATION DETAILS SHOWN ARE DESCRIPTIVE ONLY AND MAY BE VARIED TO CONFORM WITH AN ESTABLISHED MANUFACTURING PROCEDURE.

FORMED OR CUT OUT OPENINGS SHALL BE PROVIDED WHERE PIPE INLETS AND OUTLETS ARE SHOWN ON THE PLANS.

THE TOP OF THE INLET SHALL NOT BE SET BELOW THE TOP OF THE OUTLET PIPE.

REINFORCEMENT SHALL BE CUT AT PIPE OPENINGS.

NO DIRECT PAYMENT WILL BE MADE FOR CUTTING PIPE, NOR FOR CUTTING AND BENDING REINFORCING STEEL.

WHERE THE WIDTH OF THE BASE SECTION IS GREATER THAN 42" AN ECCENTRIC TAPER SECTION MAY BE USED TO ALLOW THE USE OF 42" RISER SECTIONS.

THE LOWER TRANSITION SECTION AS SHOWN ON SECTION A-A IS OPTIONAL.

FOUL WATER DROPS ARE REQUIRED WHEN SPECIFIED IN THE PLANS. NO DIRECT PAYMENT WILL BE MADE FOR THE FOUL WATER DROP OR ITS ENCASEMENT.

SEE STANDARD PLAN 614.30 FOR MANHOLE FRAMES AND COVERS.

WHERE PIPES DO NOT ENTER OR EXIT RADially, USE NEXT LARGER SIZE MANHOLE. CLASS 3 EXCAVATION WILL BE PAID WITHIN VERTICAL LIMITS 18" OUTSIDE OF THE OUTER WALLS OF THE BASE SECTION ON THE MANHOLE. CLASS 3 EXCAVATION WILL NOT BE PAID FOR OUTSIDE THE FOOTING LIMITS.

ALL PIPE CONNECTED WITH A MANHOLE WILL BE MEASURED AND PAID FOR TO THE INSIDE WALL OF THE MANHOLE.

CIRCUMFERENTIAL REINFORCEMENT SIZE AND PLACEMENT SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS TO A MAXIMUM DEPTH OF 20 FEET. OVER 20 FOOT DEPTH CIRCUMFERENTIAL REINFORCEMENT IS INCREASED TO 0.24 SQUARE INCHES STEEL REQUIRED PER LINEAR FOOT, TO A MAXIMUM DEPTH OF 30 FEET.

FOR PIPE CONNECTIONS, A RUBBER GASKET IN ACCORDANCE WITH ASTM RUBBER GASKET SPECIFICATIONS C-443 OR C-923 AND CAST INTEGRALLY IN MANHOLE MAY BE USED AS AN ALTERNATE TO EXPANSIVE MORTAR.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PRECAST MANHOLES**

STATE OF MISSOURI

ERIC E. SCHROETER

NUMBER PE-28411

PROFESSIONAL ENGINEER

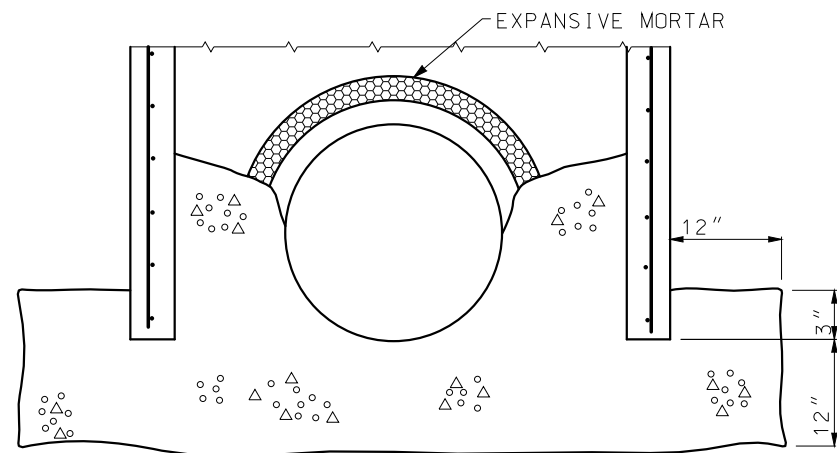
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE EFFECTIVE: 07/01/2016

DATE PREPARED: 5/13/2016

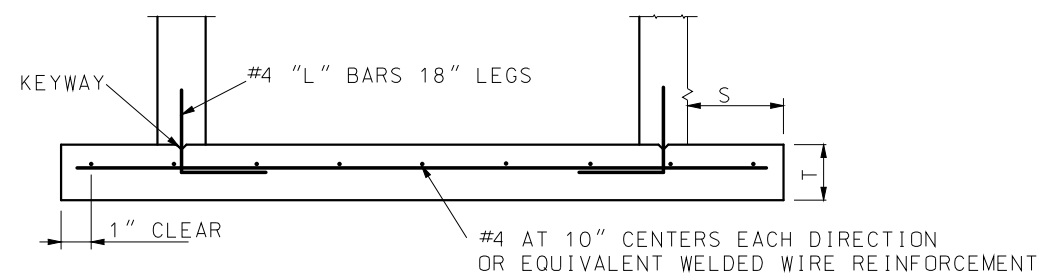
731.00U

SHEET NO. 1 OF 2



ALTERNATE FOOTING

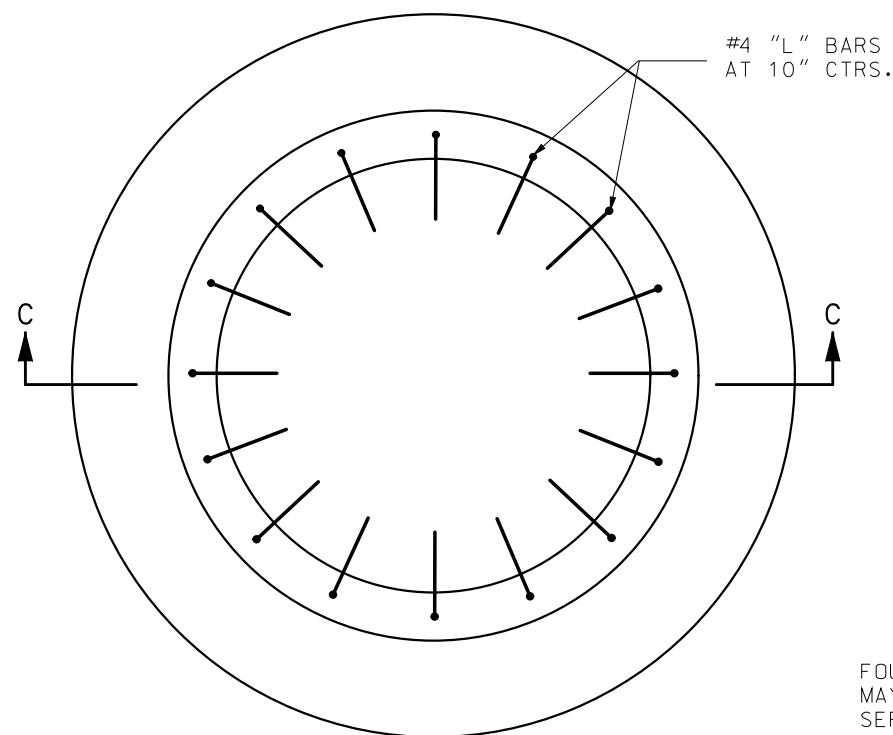
PRECAST BASE SECTION SET ON CONCRETE BLOCKS FOUNDATION SLAB AND INVERT POURED MONOLITHIC.



SECTION C-C

S = 0 FOR DEPTHS LESS THAN OR EQUAL TO 6';  
S = 9" FOR DEPTHS GREATER THAN 6'.

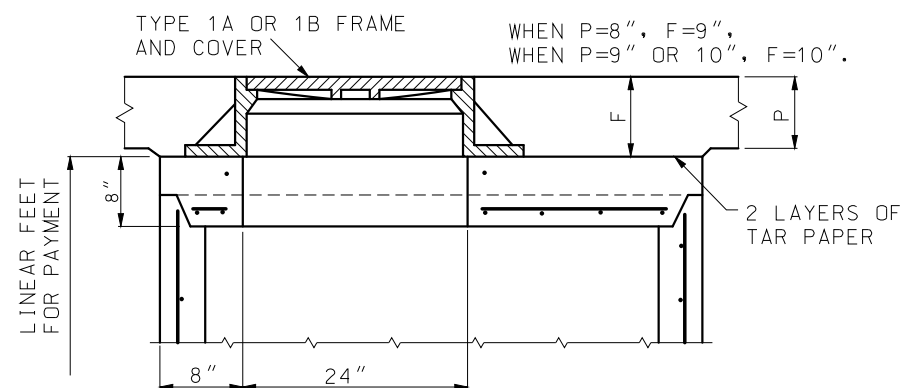
T = 6" FOR DEPTHS OR LESS THAN OR EQUAL TO 6';  
T = 9" FOR DEPTHS GREATER THAN 6'.



PRECAST FOUNDATION SLAB

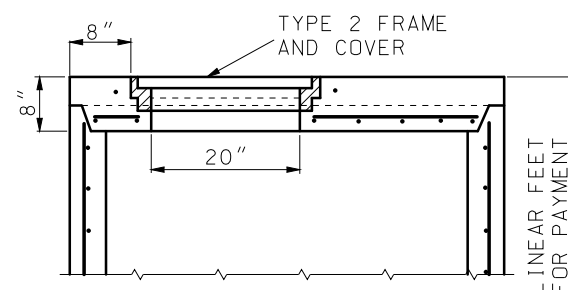
FOUNDATION SLAB AND BASE SECTION MAY BE POURED MONOLITHIC OR SEPARATELY WITH A KEYWAY.

INVERT SHALL BE POURED AFTER PLACEMENT OF MANHOLE.



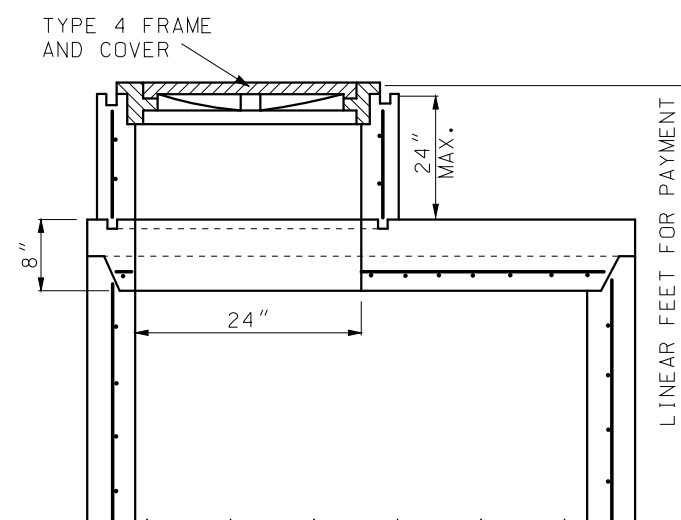
FLAT SLAB MANHOLE TOP (PAVED AREA)

SECTION B-B

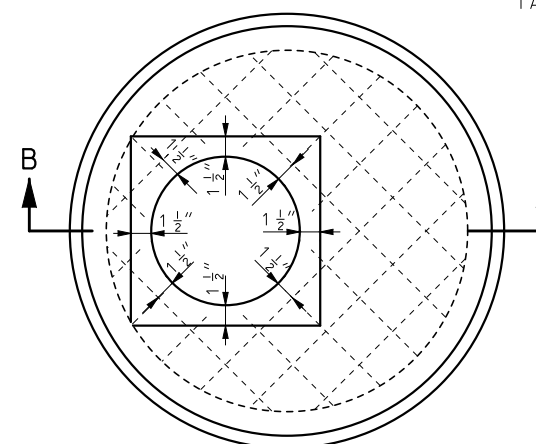


ALTERNATE SECTION B-B

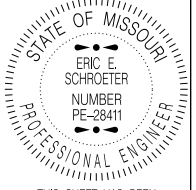
ALTERNATE FLAT SLAB MANHOLE TOP (UNPAVED AREA) USED WHERE DEPTH OF MANHOLE WILL NOT PERMIT USE OF CONE AND TAPER SECTIONS.



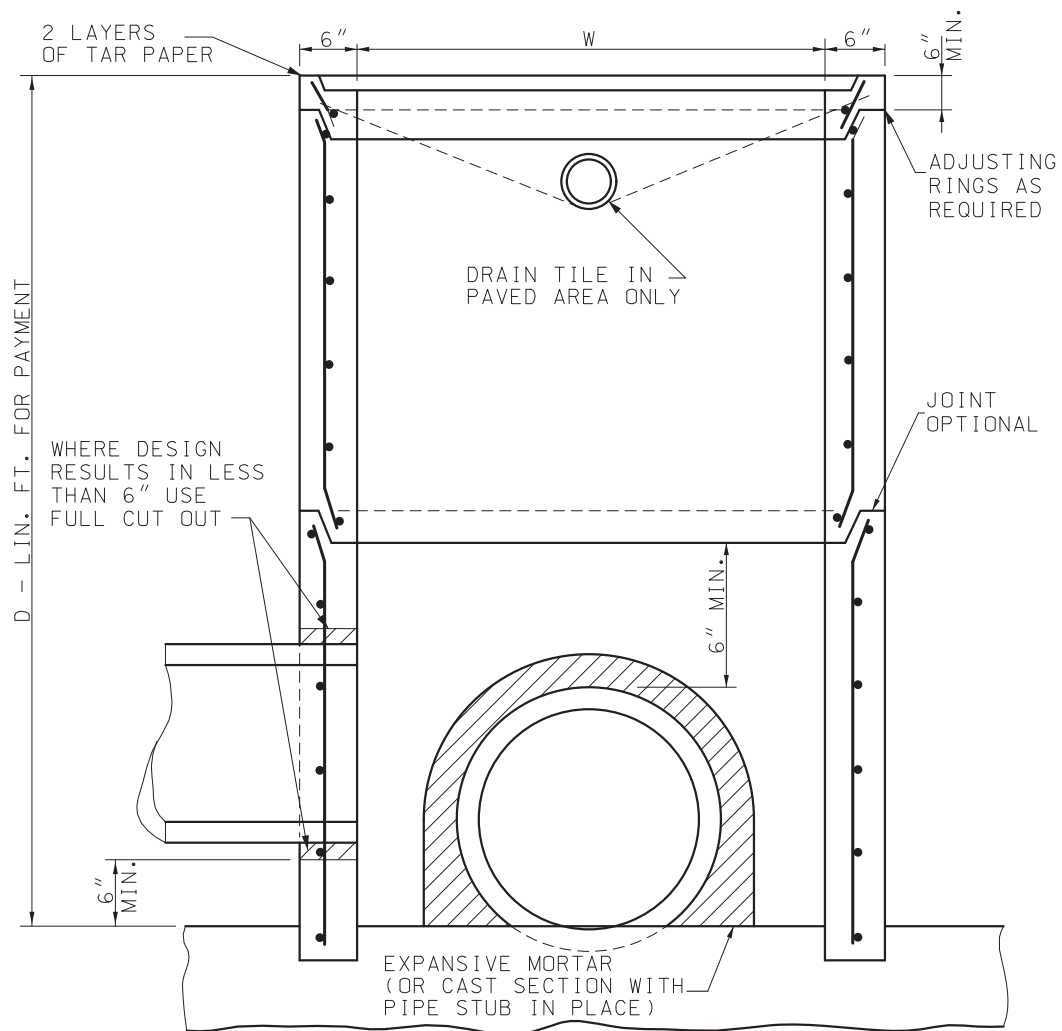
ALTERNATE MANHOLE TOP



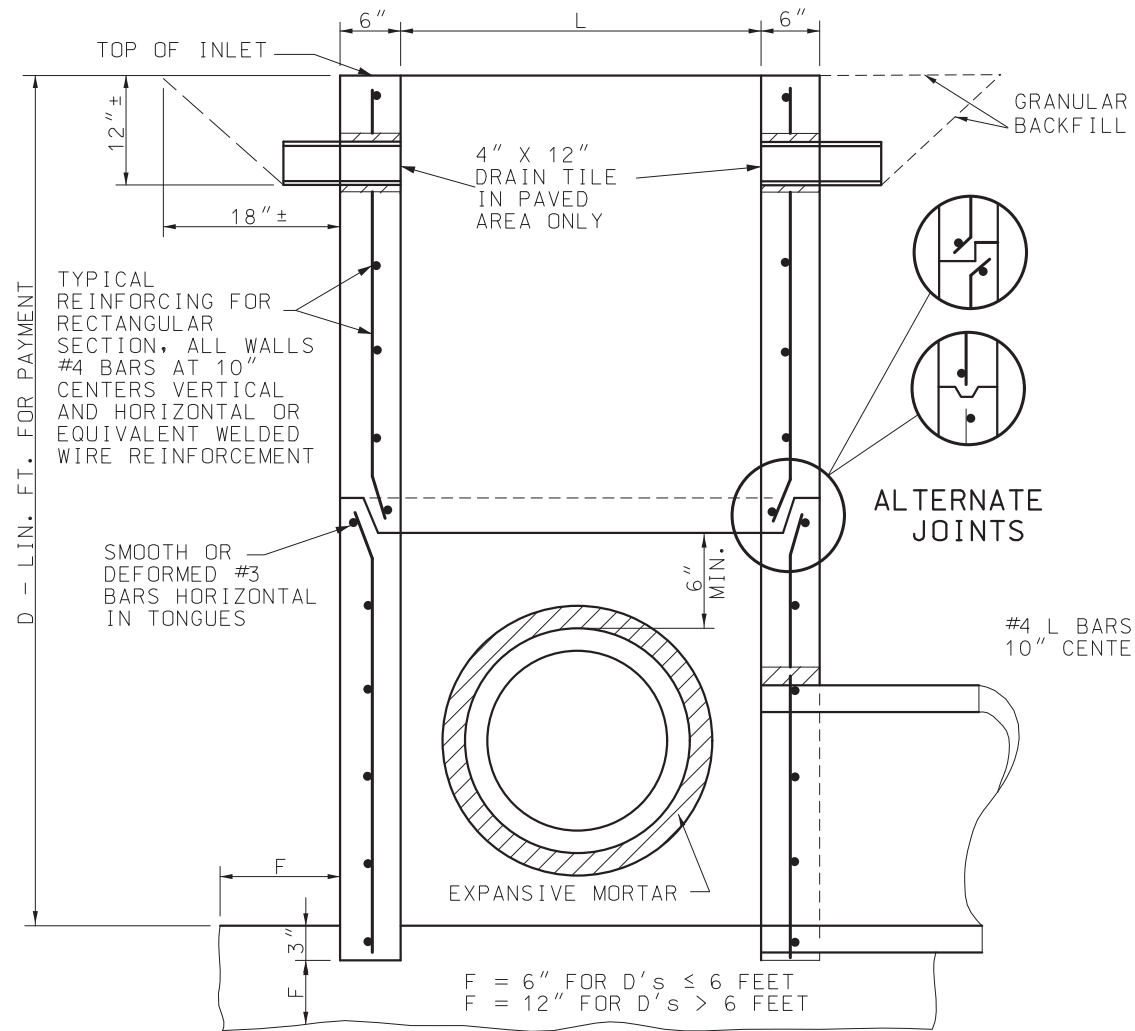
PLAN OF FLAT SLAB MANHOLE TOP

|                                                                                                                                                                                                                                          |                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)         |                         |
|  STATE OF MISSOURI<br>ERIC E. SCHROETER<br>NUMBER PE-28411<br>PROFESSIONAL ENGINEER<br>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY. | <b>PRECAST MANHOLES</b> |
| DATE EFFECTIVE: 07/01/2016<br>DATE PREPARED: 5/13/2016                                                                                                                                                                                   | 731.00U                 |
| SHEET NO.<br>2 OF 2                                                                                                                                                                                                                      |                         |

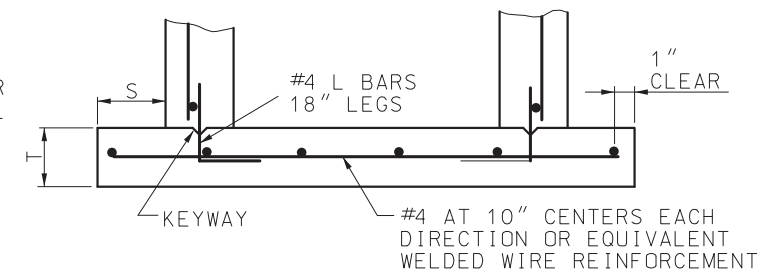




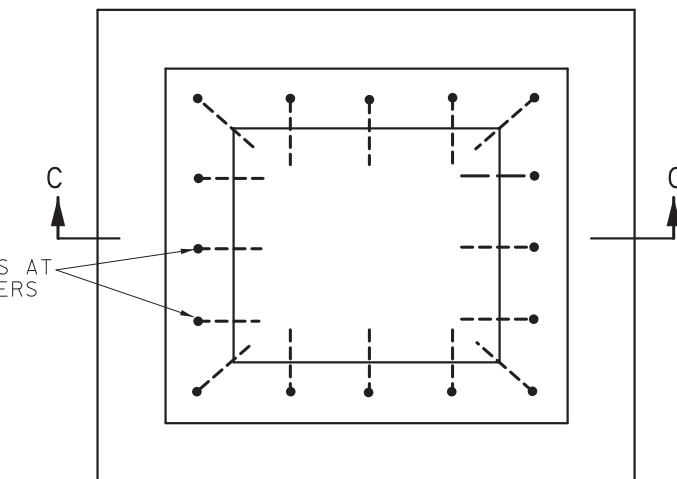
SECTION A-A



SECTION B-B



SECTION C-C



$$S = 0 \text{ FOR } D \leq 6 \text{ FEET AND } 9''$$

$$\text{FOR } D > 6 \text{ FEET}$$

$$T = 6'' \text{ FOR } D \leq 6 \text{ FEET AND } 9''$$

$$\text{FOR } D > 6 \text{ FEET}$$

FOUNDATION SLAB AND BASE SECTION MAY BE POURED MONOLITHIC OR SEPARATELY WITH A KEYWAY.

## PRECAST FOUNDATION SLAB

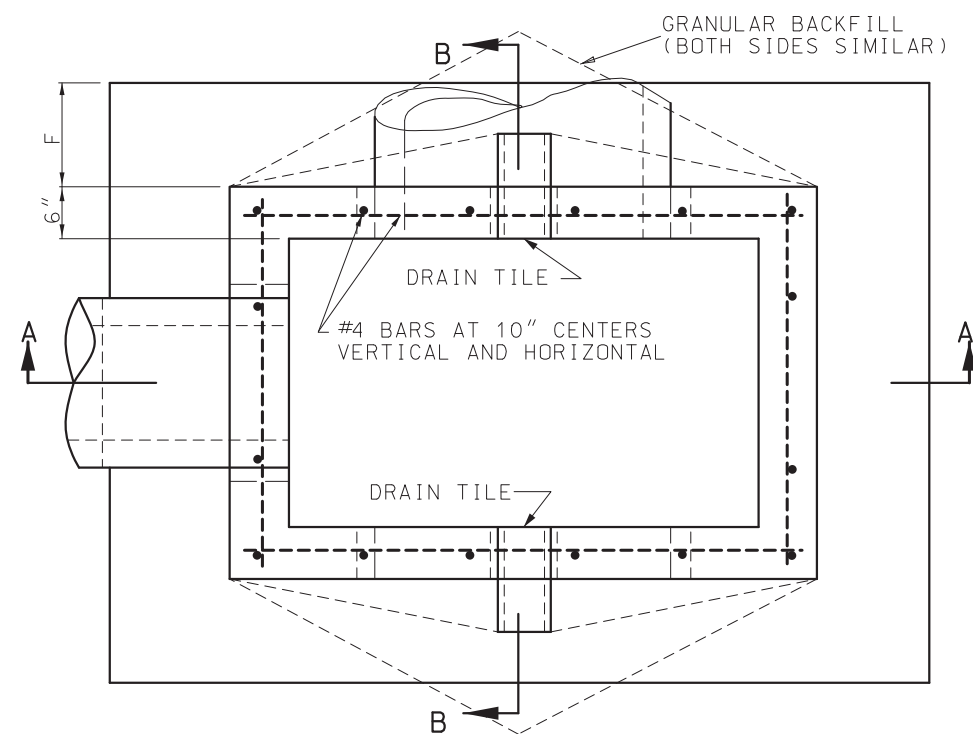
### GENERAL NOTES:

STEPS SHALL BE PLACED AT VERTICAL INTERVALS OF 16" MAXIMUM IN ALL INLETS HAVING A DEPTH OF MORE THAN 4 FEET. STEPS SHALL BEGIN AT AN ELEVATION 6" ABOVE THE TOP OF THE OUTLET PIPE.

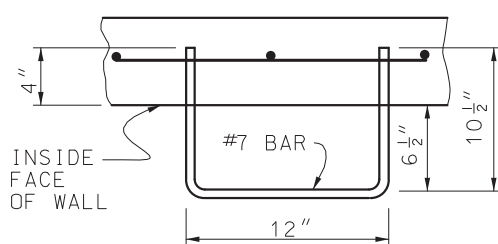
STEPS SHALL BE SET LEVEL AND IN VERTICAL ALIGNMENT AND NOT NEARER THAT 3" TO A JOINT.

NO DIRECT PAYMENT WILL BE MADE FOR INLET STEPS.

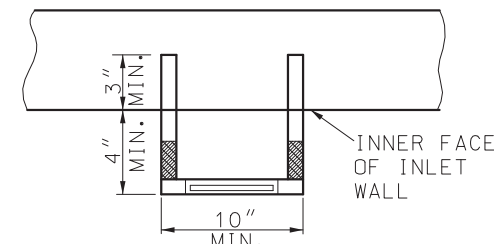
STEPS ARE NOT REQUIRED FOR TYPE D INLETS.



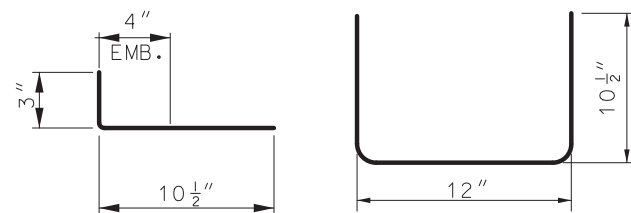
INLET PLAN



STEPS

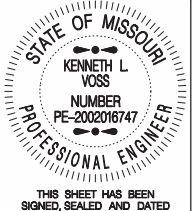


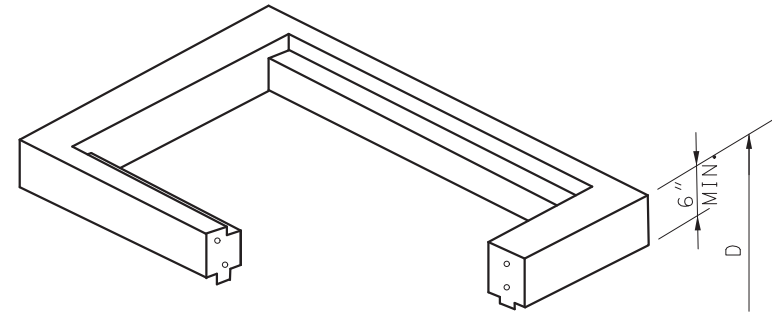
STEP INSTALLATION  
(OTHER THAN STEEL BAR)



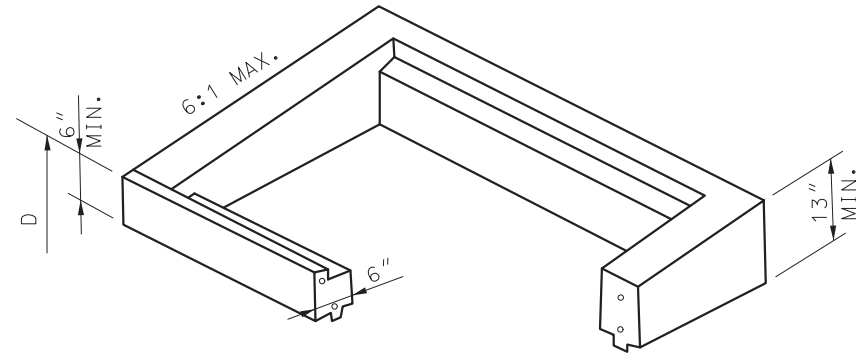
BENDING DIAGRAM  
STEEL STEP BAR

S - BARS

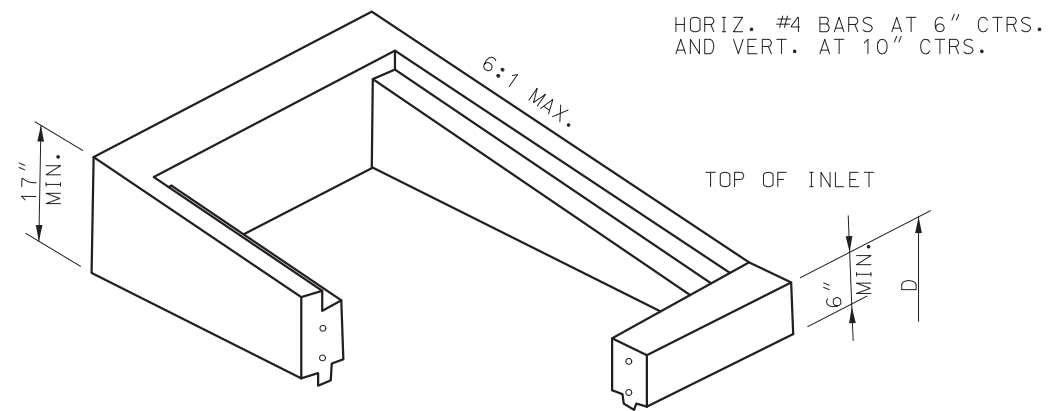
|                                                                                                                                                                                                                                  |                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                           |
|                                                                                                                                             | <b>PRECAST DROP INLET</b> |
| DATE EFFECTIVE: 1/1/2025<br>DATE PREPARED: 10/4/2024                                                                                                                                                                             | <b>731.10T</b>            |
| SHEET NO.<br><b>1 OF 8</b>                                                                                                                                                                                                       |                           |



TYPE S-1



TYPE S-2

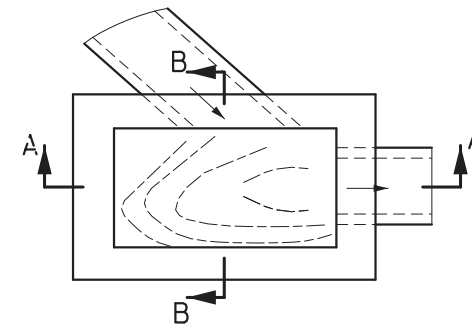


TYPE S-3

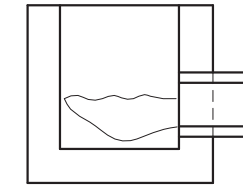
SEE STANDARD PLAN 614.10 FOR GRATES AND BEARING PLATES. TYPICAL LOCATION DETAILS ARE INDICATED ON SHEETS 7 AND 8 OF 8. TOP SECTIONS MAY BE CAST MONOLITHIC WITH BASE SECTION.

HORIZ. #4 BARS AT 6" CTRS.  
AND VERT. AT 10" CTRS.

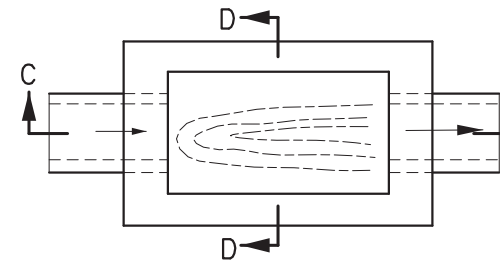
| DROP INLET   |               |                    |
|--------------|---------------|--------------------|
| WIDTH<br>FT. | LENGTH<br>FT. | TYPE               |
| 2            | 2             | A, B, C            |
| 4            | 2             |                    |
| 2            | 2             | D                  |
| 3            | 2             | E, S-1<br>S-2, S-3 |
| 3            | 3             |                    |
| 5            | 2             |                    |
| 5            | 3             |                    |



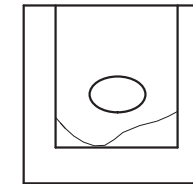
SECTION A-A



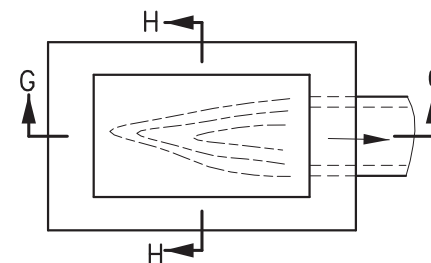
SECTION B-B



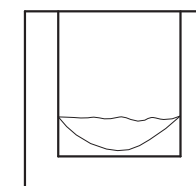
SECTION C-C



SECTION D-D

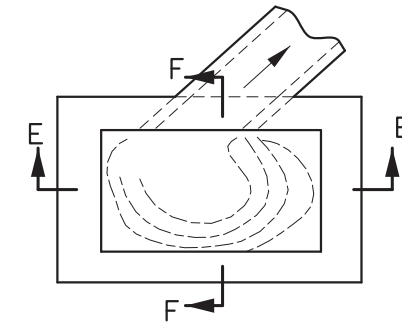


SECTION G-G

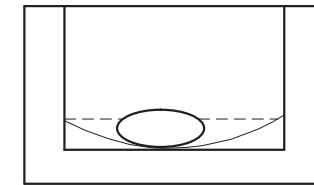


SECTION H-H

TYPICAL INVERTS



SECTION E-E



SECTION F-F

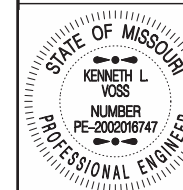
#### GENERAL NOTES:

THE CONCRETE FOR INVERTS SHALL BE PLACED AFTER COMPLETION OF THE DROP INLET BOX. NO DIRECT PAYMENT WILL BE MADE FOR FURNISHING OR PLACING INVERT CONCRETE.



#### MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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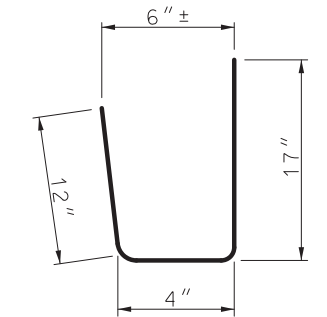
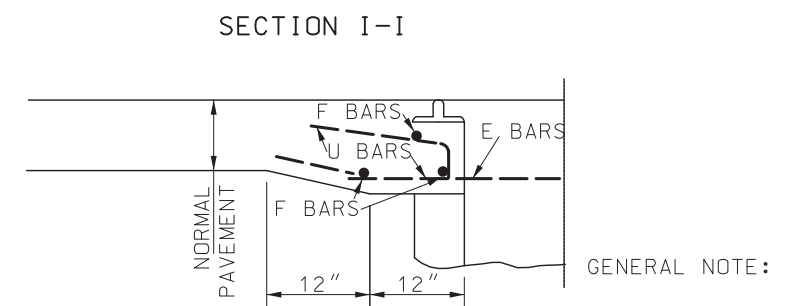
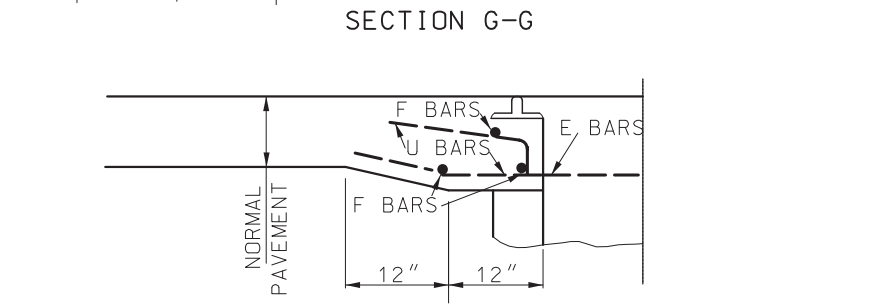
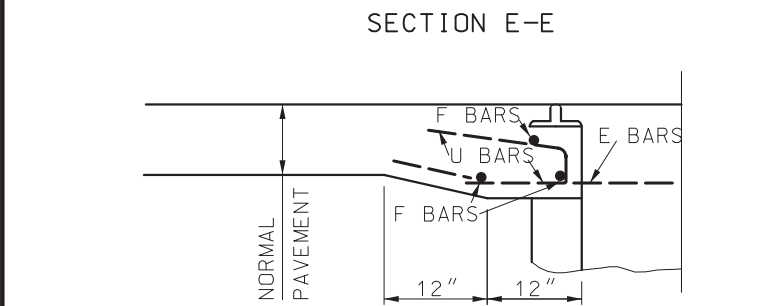
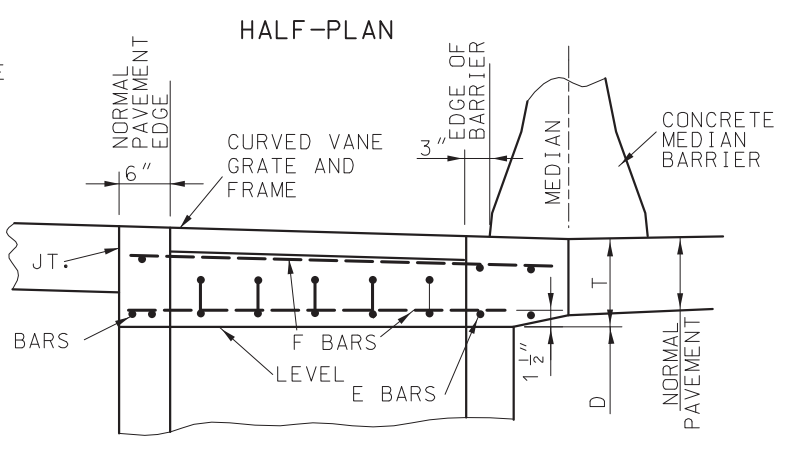
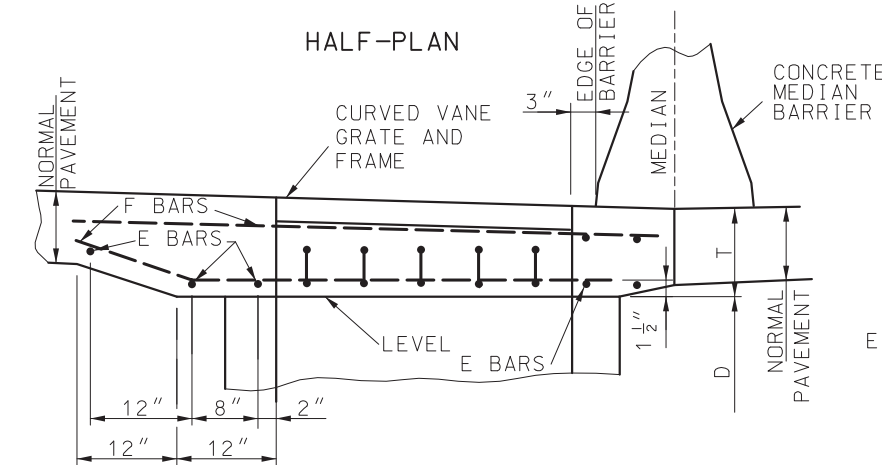
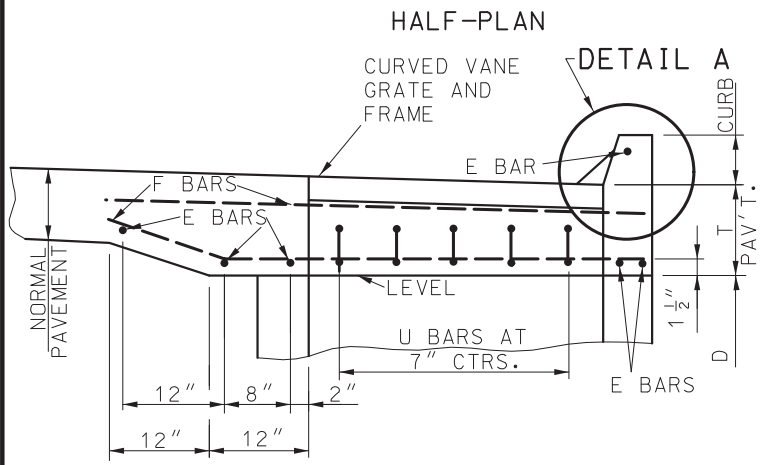
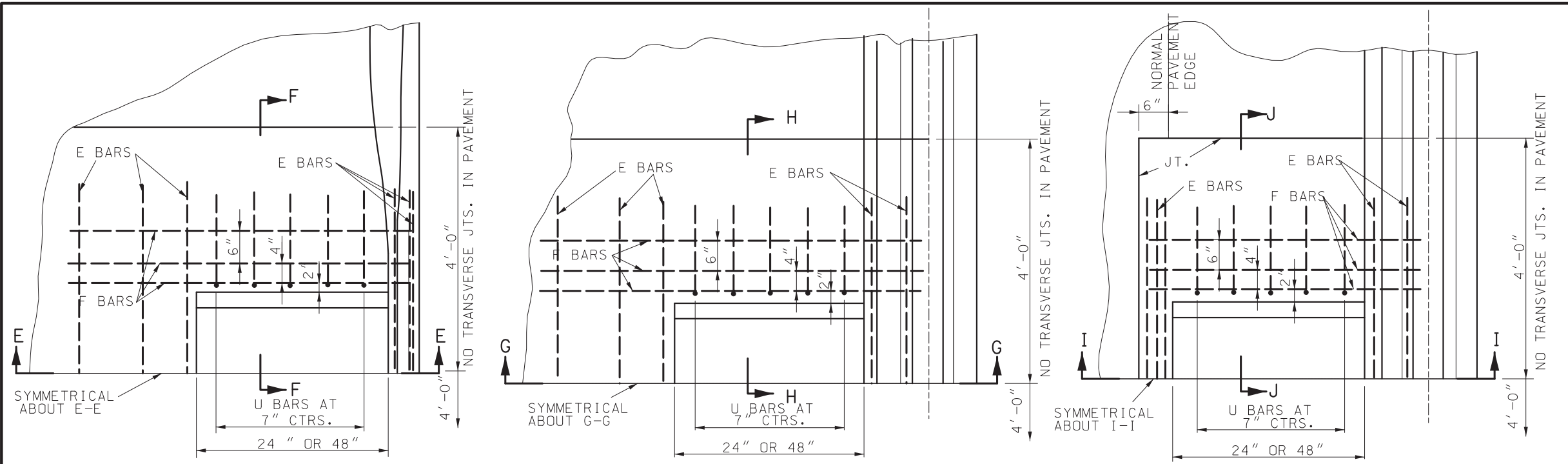
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

#### PRECAST DROP INLET

DATE EFFECTIVE: 1/1/2025  
DATE PREPARED: 10/4/2024

731.10T

SHEET NO.  
2 OF 8



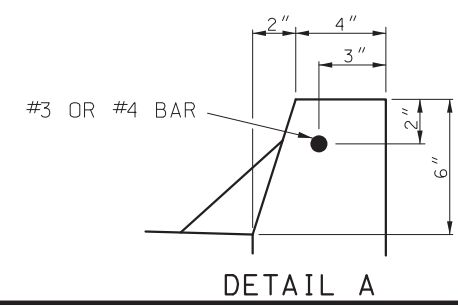
BARS E, F, & U.....#4

| PAVEMENT BAR BILL |       |        |      |     |        |
|-------------------|-------|--------|------|-----|--------|
| TYPE              | WIDTH | LENGTH | MARK | NO. | LENGTH |
| A                 | 4'    | 2'     | E    | 6   | 6'-0"  |
|                   |       |        | F    | 6   | 6'-6"  |
|                   |       |        | U    | 14  | 2'-9"  |
|                   | 2'    | 2'     | E    | 6   | 6'-0"  |
|                   |       |        | F    | 6   | 4'-6"  |
|                   |       |        | U    | 8   | 2'-9"  |
| B                 | 4'    | 2'     | E    | 7   | 6'-0"  |
|                   |       |        | F    | 6   | 7'-0"  |
|                   |       |        | U    | 14  | 2'-9"  |
|                   | 2'    | 2'     | E    | 7   | 6'-0"  |
|                   |       |        | F    | 6   | 5'-0"  |
|                   |       |        | U    | 8   | 2'-9"  |
| C                 | 4'    | 2'     | E    | 7   | 6'-0"  |
|                   |       |        | F    | 6   | 5'-3"  |
|                   |       |        | U    | 14  | 2'-9"  |
|                   | 2'    | 2'     | E    | 7   | 6'-0"  |
|                   |       |        | F    | 6   | 3'-3"  |
|                   |       |        | U    | 8   | 2'-9"  |
| D                 | 2'    | 2'     | E    | 6   | 7'-0"  |
|                   |       |        | F    | 6   | 2'-9"  |
|                   |       |        | U    | 8   | 2'-9"  |

TYPE A  
INLET ADJACENT TO CURB

TYPE B  
DISTANCE BETWEEN BARRIER AND PAVEMENT EDGE GREATER THAN INLET WIDTH

TYPE C  
DISTANCE BETWEEN BARRIER AND PAVEMENT EDGE EQUAL TO INLET WIDTH



GENERAL NOTE:  
SEE STANDARD PLAN 614.11 FOR CURVED VANE GRATE.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

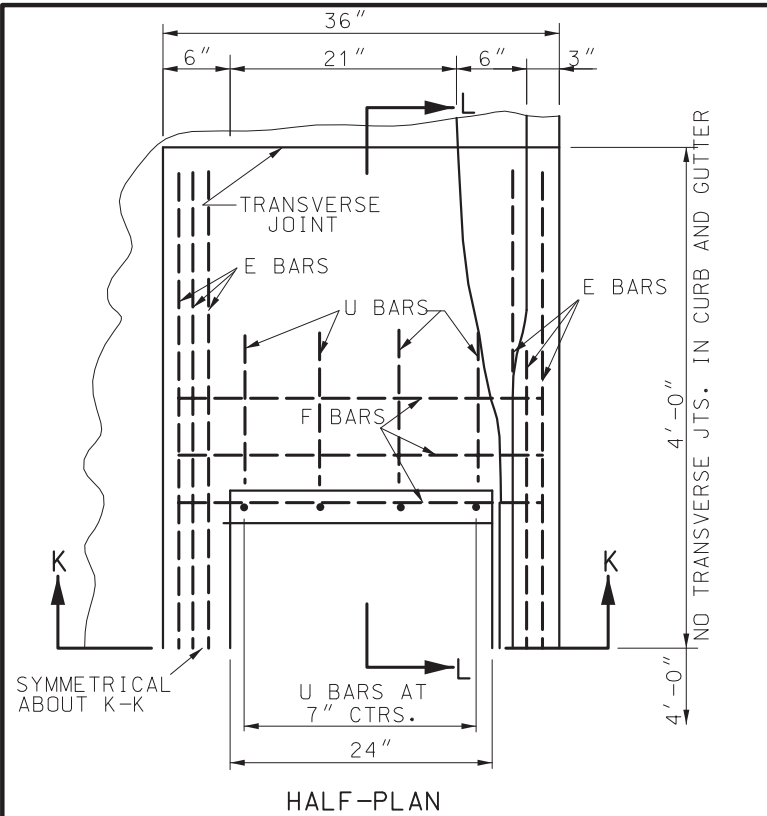
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**PRECAST DROP INLET COVERS**

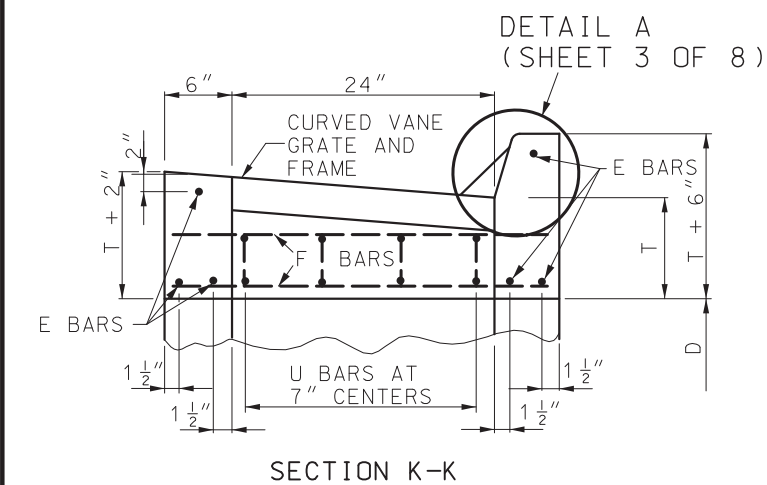
DATE EFFECTIVE: 1/1/2025  
DATE PREPARED: 10/4/2024

731.10T

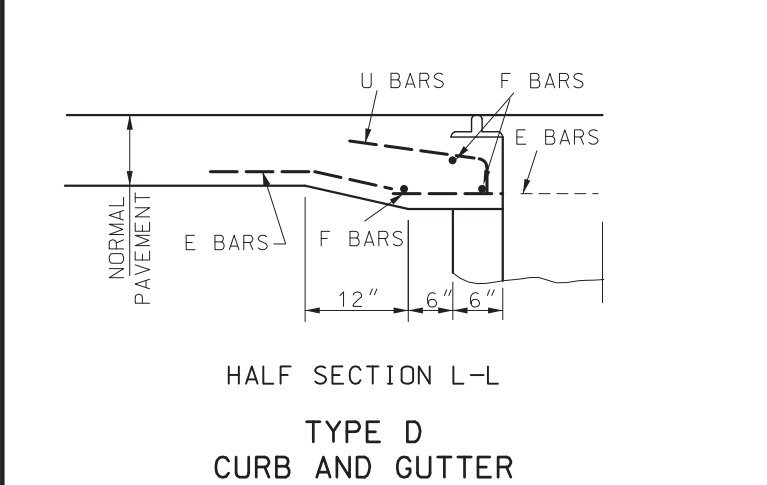
SHEET NO.  
3 OF 8



HALF-PLAN

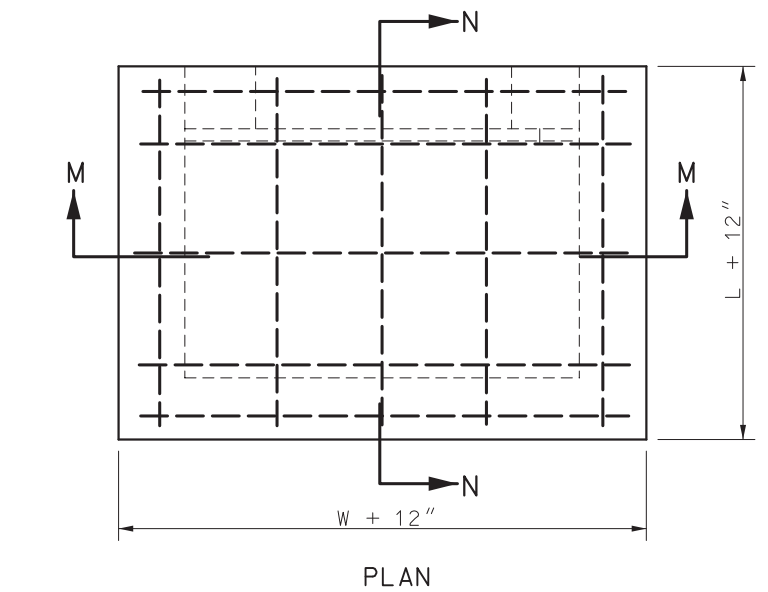


SECTION K-K

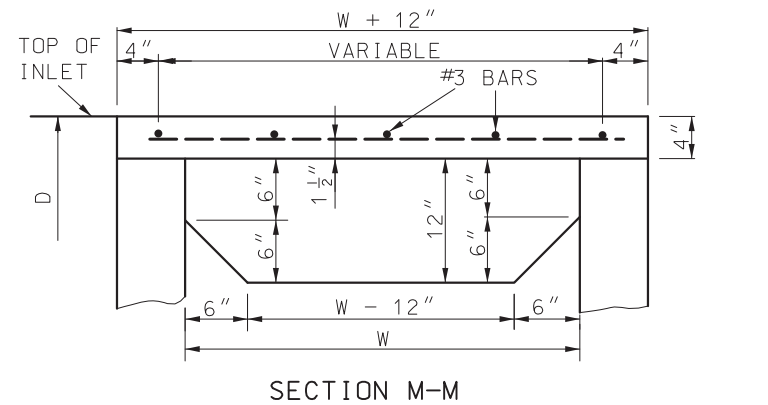


HALF SECTION L-L

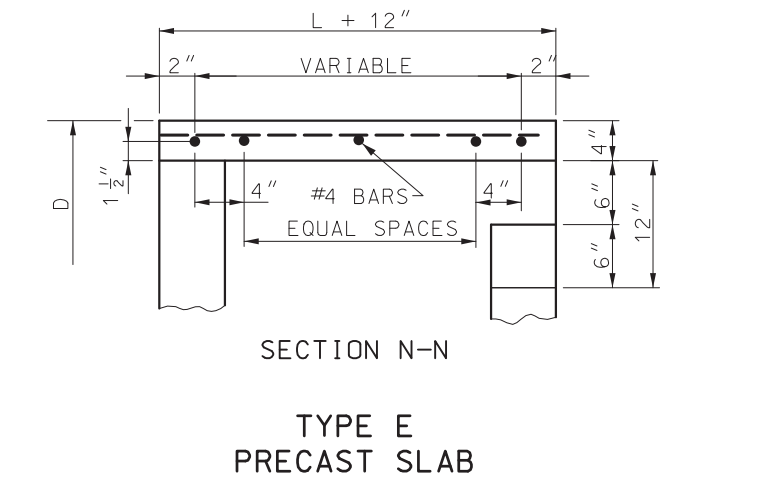
TYPE D  
CURB AND GUTTER



PLAN



SECTION M-M



SECTION N-N

TYPE E  
PRECAST SLAB

| PAVEMENT THICKNESS           | "T" DIMENSION |
|------------------------------|---------------|
| LESS THAN OR EQUAL TO 11"    | 11"           |
| 12"                          | 12"           |
| 13"                          | 13"           |
| GREATER THAN OR EQUAL TO 14" | 14"           |

| TYPE E COVER BAR BILL |        |          |     |        |
|-----------------------|--------|----------|-----|--------|
| WIDTH                 | LENGTH | BAR SIZE | NO. | LENGTH |
| 3'                    | 2'     | #3       | 5   | 2'-9"  |
|                       |        | #4       | 5   | 3'-9"  |
| 3'                    | 3'     | #3       | 5   | 3'-9"  |
|                       |        | #4       | 5   | 3'-9"  |
| 5'                    | 2'     | #3       | 6   | 2'-9"  |
|                       |        | #4       | 6   | 5'-9"  |
| 5'                    | 3'     | #3       | 6   | 3'-9"  |
|                       |        | #4       | 7   | 5'-9"  |

GENERAL NOTES:

THE SIZE OF THE DROP INLET AND TYPE OF COVER WILL BE SHOWN ON THE PLANS.

THE CONFIGURATION DETAILS SHOWN ARE DESCRIPTIVE ONLY AND MAY BE VARIED TO CONFORM WITH ESTABLISHED MANUFACTURING PROCEDURES.

TOP OF DROP INLET WALL SHALL BE CONSTRUCTED TO THE ELEVATION OF BOTTOM OF SLAB AT THE EDGE OF PAVEMENT OR BOTTOM OF CURB AND GUTTER AT DROP INLET.

WHERE THE DROP INLET IS LOCATED IN AN UNPAVED AREA, THE TOP OF THE DROP INLET WALLS SHALL BE SET TO THE ELEVATION SHOWN ON THE PLANS.

ALL CONCRETE ABOVE THE TAR PAPER SEPARATION JOINT IS TO BE CONSTRUCTED DURING PAVING OPERATIONS OR CURB AND GUTTER CONSTRUCTION, AND WILL BE PAID FOR AS SQUARE YARDS OF CONCRETE PAVEMENT OR LINEAR FEET OF CURB AND GUTTER.

FORMED OR CUT-OUT OPENINGS SHALL BE PROVIDED WHERE PIPE INLETS AND OUTLETS ARE SHOWN ON THE PLANS.

REINFORCING BARS IN PAVEMENT SHALL BE EPOXY COATED AND SECURELY TIED TOGETHER AND FASTENED TO AVOID ANY POSSIBLE DISPLACEMENT DURING THE PLACING OF CONCRETE. REINFORCEMENT SHOWN IS IN ADDITION TO ANY REINFORCEMENT SHOWN FOR CONCRETE PAVEMENT OR CURB AND GUTTER.

JOINTS SHALL BE SEALED IN ACCORDANCE WITH SECTION 726.3.1 OF THE STANDARD SPECIFICATIONS.

THE CONTRACTOR WILL BE PERMITTED TO CAST IN PLACE THE DROP INLETS CALLED FOR IN THE PLANS, TO THE DIMENSIONS REQUIRED FOR PRECAST DROP INLETS.

WELDED WIRE REINFORCEMENT MAY BE IN LIEU OF REINFORCING BARS, THE REINFORCEMENT SHALL NOT BE LESS THAN .23 SQUARE INCHES PER LINEAR FOOT BOTH HORIZONTALLY AND VERTICALLY.

NO DIRECT PAYMENT WILL BE MADE FOR REINFORCING STEEL.

NO DIRECT PAYMENT WILL BE MADE FOR CUTTING PIPE NOR FOR CUTTING OR BENDING REINFORCING STEEL.

THE TOP OF INLET PIPES SHALL NOT BE SET BELOW THE TOP OF THE OUTLET PIPE.

NO DIRECT PAYMENT WILL BE MADE FOR FORMING FOR CURVED VANE GRATES AND FRAMES.

THE REINFORCEMENT SHOWN IS THE MINIMUM REQUIRED. AT THE CONTRACTOR'S OPTION, ADDITIONAL REINFORCEMENT MAY BE USED.

REINFORCING STEEL EDGE DISTANCE WILL BE 1 1/2" UNLESS OTHERWISE SPECIFIED.

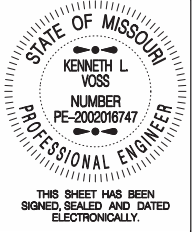
NOT MORE THEN TWO LIFT HOLES OR LIFTING INSERTS MAY BE PROVIDED.

CLASS 3 EXCAVATION WILL BE PAID WITHIN VERTICAL PLANES 18" OUTSIDE OF THE OUTER WALLS OF THE BASE SECTION OF THE DROP INLETS, CLASS 3 EXCAVATION WILL NOT BE PAID FOR OUTSIDE THE FOOTING LIMITS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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JEFFERSON CITY, MO 65102  
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**PRECAST DROP INLET COVERS**

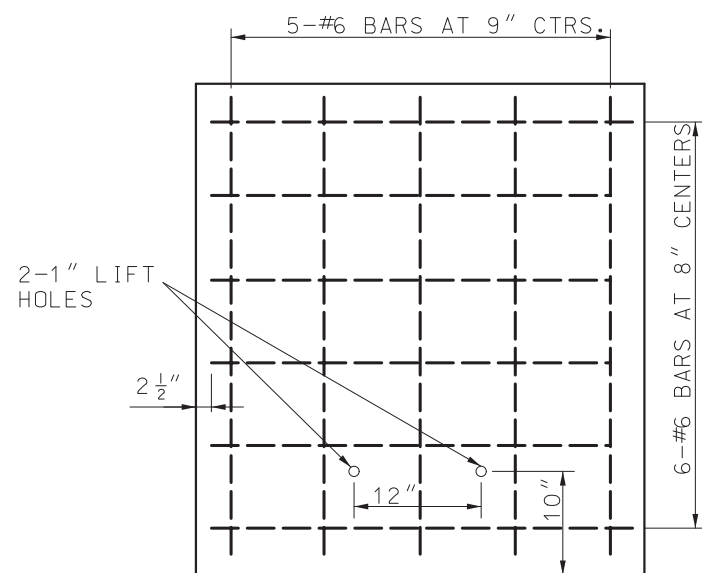
DATE EFFECTIVE: 1/1/2025  
DATE PREPARED: 10/4/2024

731.10T

SHEET NO.  
4 OF 8

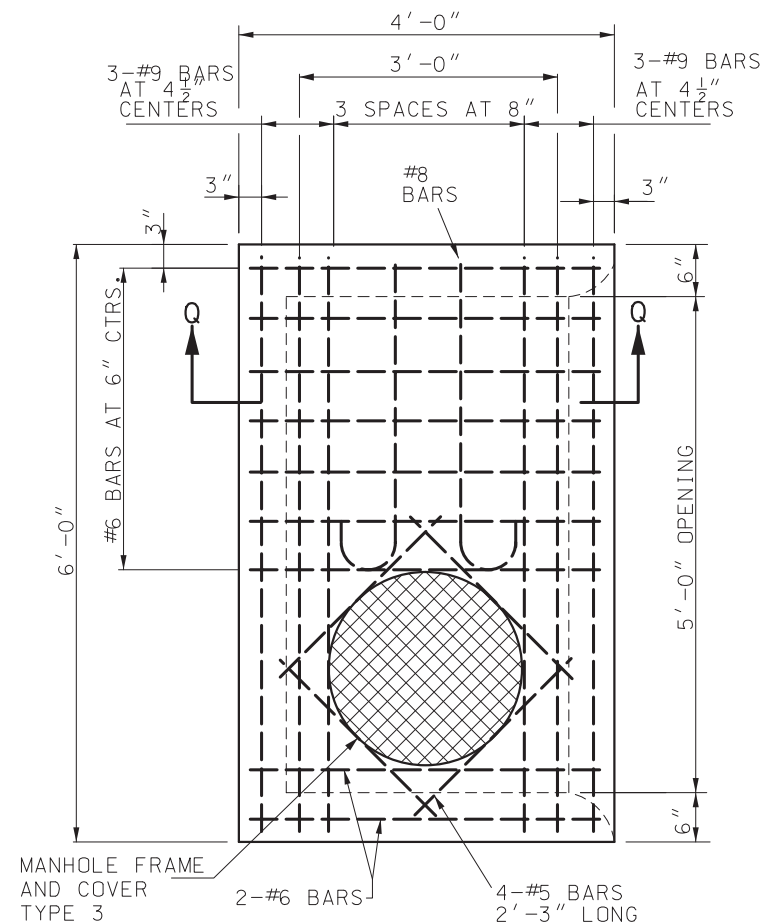




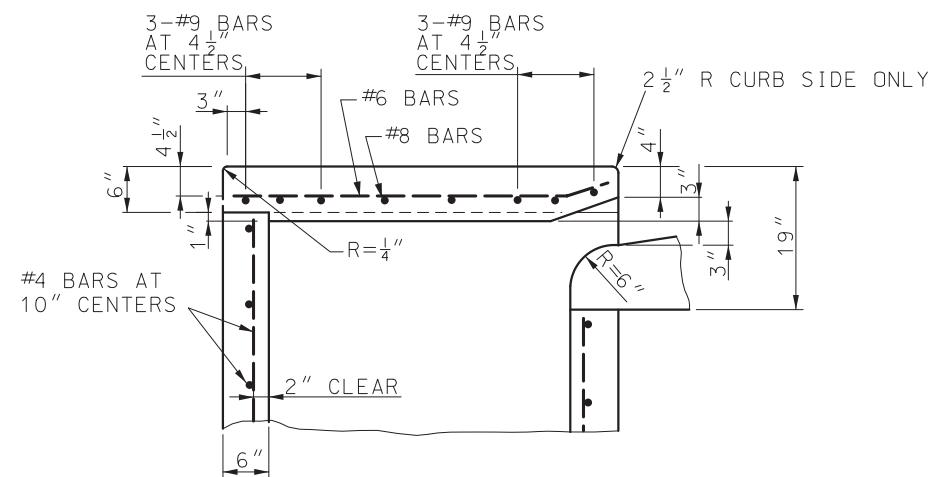


NOTE: REINFORCING FOR LIDS ON  
UPSTREAM SECTIONS.

### LID FOR ADJACENT SECTIONS



PLAN



SECTION Q-Q

### OPTIONAL PRECAST CURB INLET 5'-0" OPENING

OTHER DETAILS ARE SAME AS  
FOR THE 2'-6" OPENING  
DROP INLET THIS SHEET.

#### GENERAL NOTES:

#### NOTES PERTAINING TO TYPE T:

THE LENGTH AND DEPTH OF THE INLET SHALL BE AS SHOWN  
ON THE PLANS.

WALLS BETWEEN THE ADJACENT SECTIONS SHALL BE SEALED  
IN ACCORDANCE WITH SECTION 726.3.1 OF THE STANDARD  
SPECIFICATIONS.

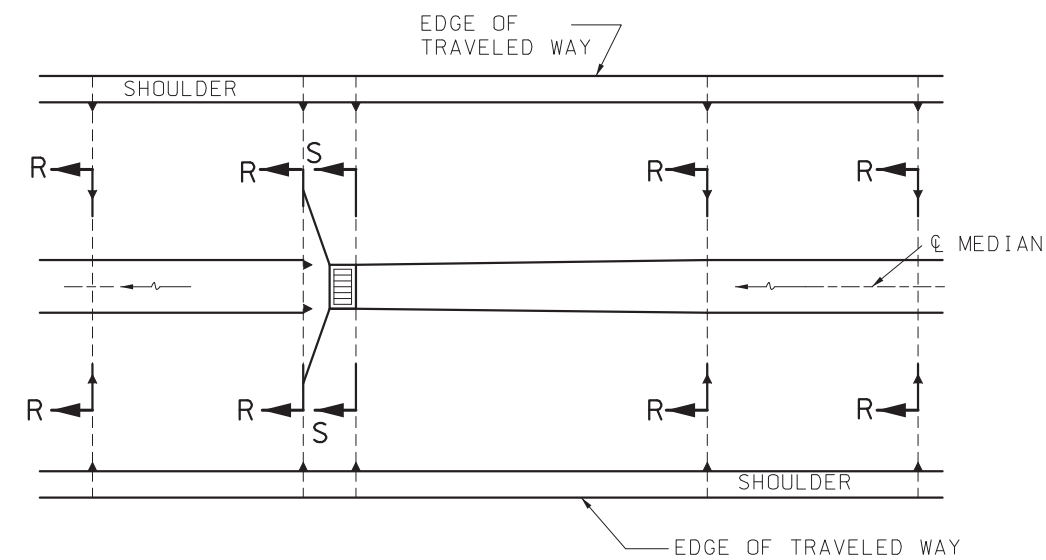
IF DEPTH OF INLET EXCEEDS 6 FEET THE PRECAST UNITS  
MAY BE FURNISHED IN TWO OR MORE SECTIONS.

IF TWO OR MORE SECTIONS ARE USED, THE TYPE 3 MANHOLE  
FRAME AND COVER SHALL BE IN THE DOWNSTREAM SECTION  
ONLY.

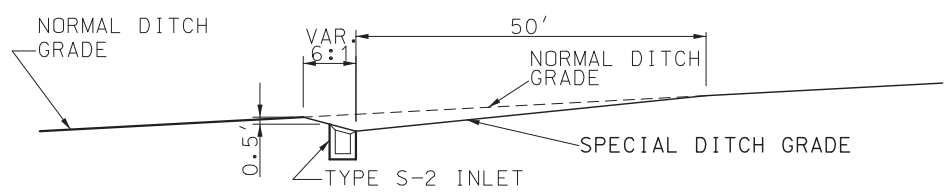
IF A 5 FOOT OPENING IS REQUIRED, TWO 2'-6" OPENING  
SECTIONS OR ONE 5 FOOT OPENING SECTION MAY BE PROVIDED  
AT THE CONTRACTOR'S OPTION.

SEE SHEET 1 FOR STEP DETAILS AND SHEET 4 FOR GENERAL  
NOTES.

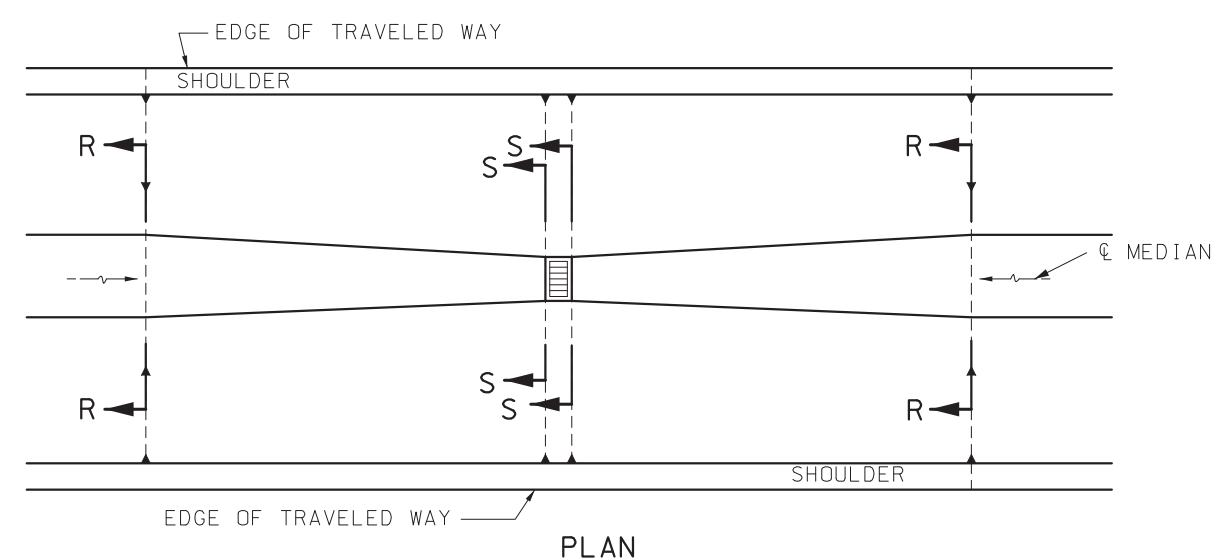
|                                                                                                                                                                                                                                      |                                                         |                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                         |                |
| <br><small>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</small>                                                         | <b>PRECAST DROP INLET</b><br><b>CURB INLET - TYPE T</b> |                |
|                                                                                                                                                                                                                                      | DATE EFFECTIVE: 1/1/2025<br>DATE PREPARED: 10/4/2024    | <b>731.10T</b> |



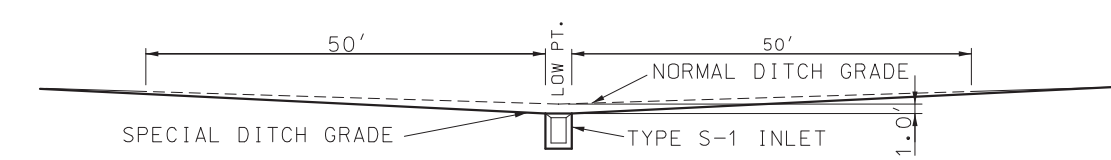
PLAN



SECTION ALONG CENTERLINE OF MEDIAN RELIEF ON GRADE

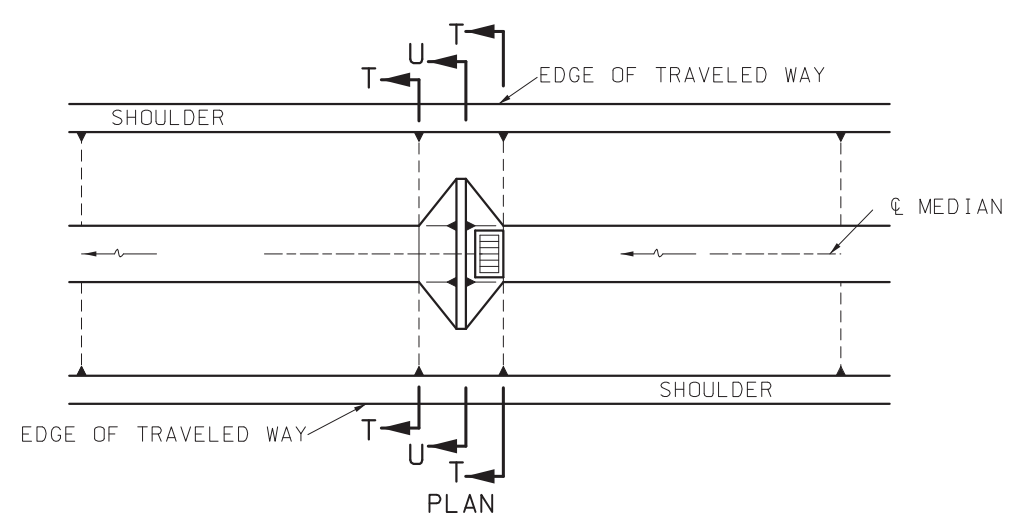


PLAN

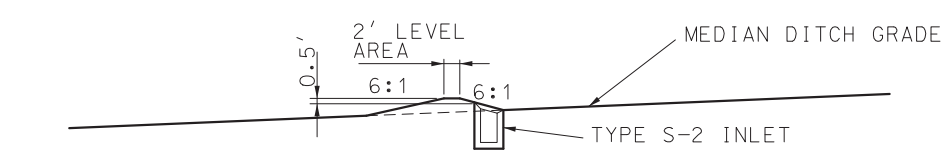


SECTION ALONG CENTERLINE OF MEDIAN RELIEF AT LOW POINT

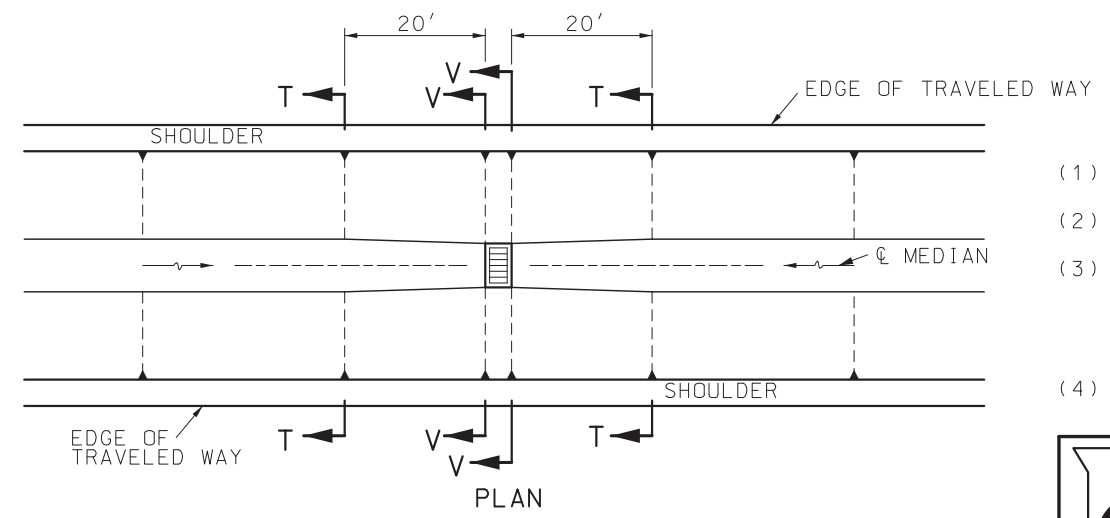
### DETAILS FOR MEDIAN RELIEF-60' MEDIAN



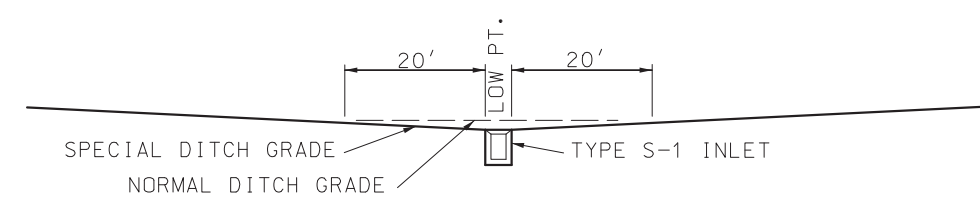
PLAN



SECTION ALONG CENTERLINE OF MEDIAN RELIEF ON GRADE

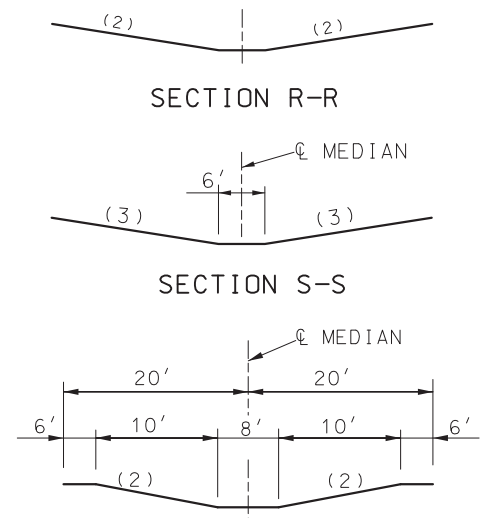


PLAN

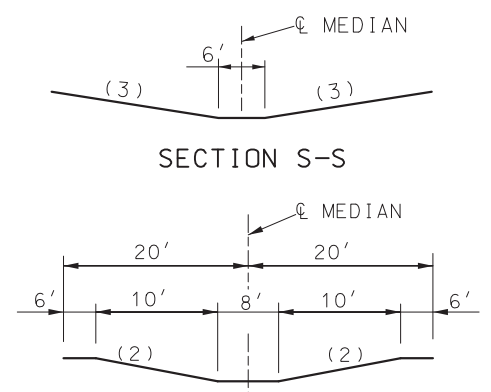


SECTION ALONG CENTERLINE OF MEDIAN RELIEF AT LOW POINT

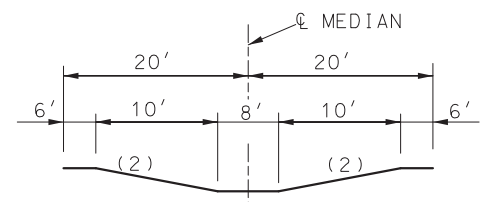
### DETAILS FOR MEDIAN RELIEF-40' MEDIAN



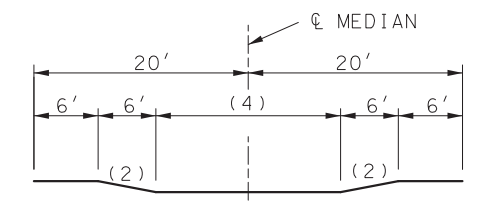
SECTION R-R



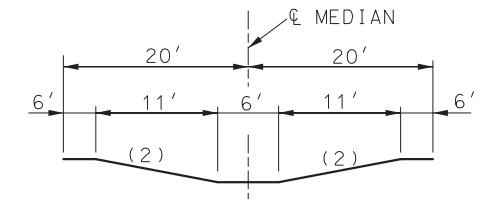
SECTION S-S



SECTION T-T



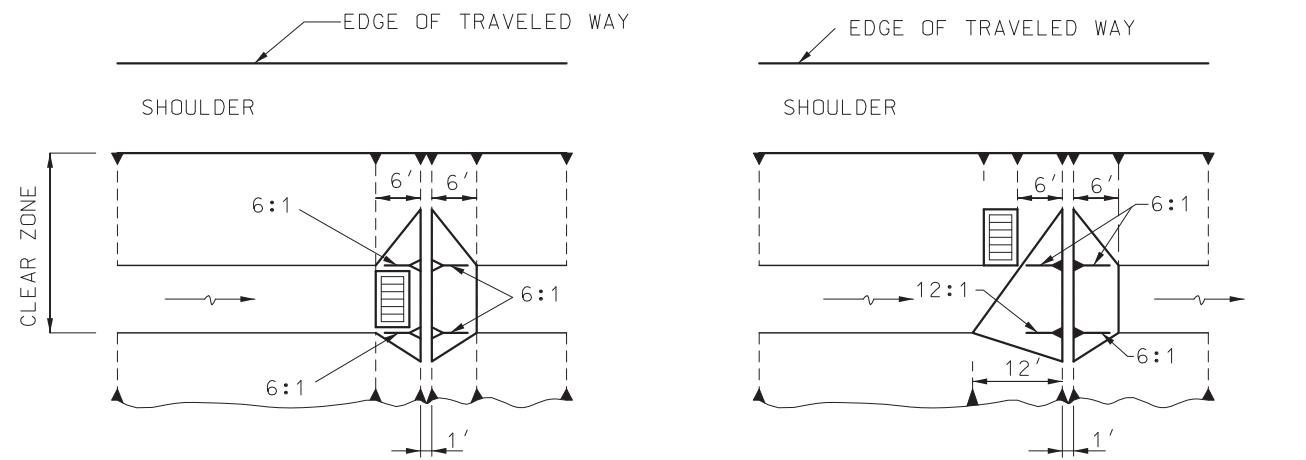
SECTION U-U



SECTION V-V

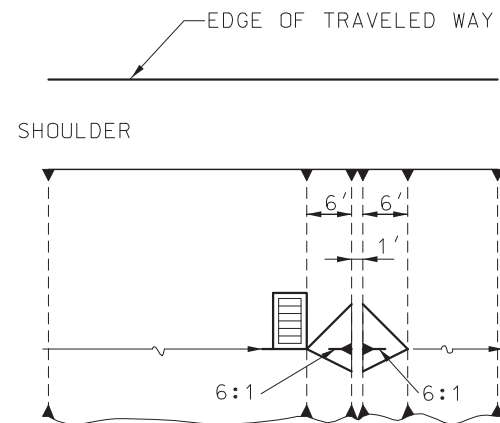
- (1) DITCH WIDTH AS GIVEN ON TYPICAL SECTION.
- (2) DITCH SLOPE AS GIVEN ON TYPICAL SECTION.
- (3) VARY SLOPE TO ACHIEVE MINIMUM 0.5 FT. FREEBOARD ABOVE TOP OF INLET GRATE ON GRADE, OR 1.0 FT. ADDITIONAL DITCH DEPTH BELOW NORMAL DITCH GRADE AT LOW POINT.
- (4) VARY WIDTH TO ACHIEVE MINIMUM 0.5 FEET FREEBOARD ABOVE TOP OF INLET GRATE.

|                                                                                                                                                                                                                                  |                                                                |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                |                |
|                                                                                                                                             | <b>PRECAST DROP INLET</b><br>TYPICAL LOCATION DETAILS - TYPE S |                |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 1/1/2025<br>DATE PREPARED: 10/4/2024           | <b>731.10T</b> |

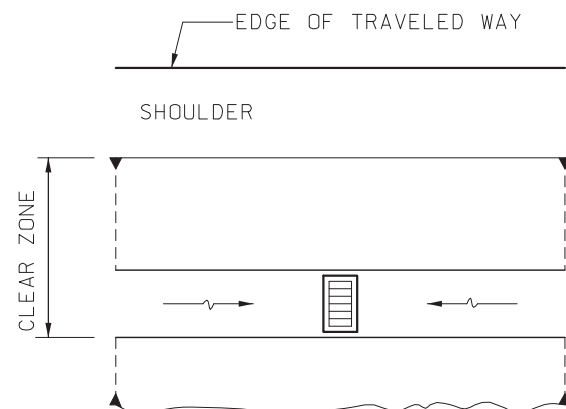


PLAN 1  
TYPE S-2 INLET IN ROADWAY DITCH  
(FLAT DITCH ON GRADE)

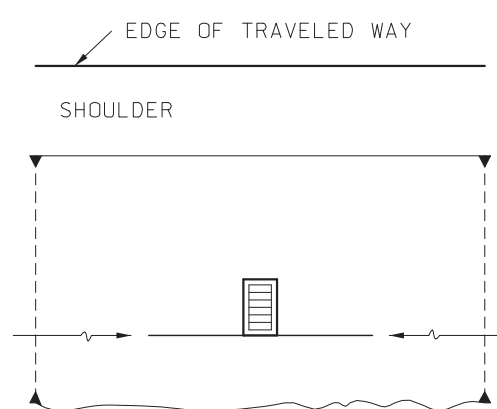
PLAN 2  
TYPE S-3 INLET IN ROADWAY DITCH  
(FLAT DITCH ON GRADE)



PLAN 3  
TYPE S-3 INLET IN ROADWAY DITCH  
(V DITCH ON GRADE)



PLAN 4  
TYPE S-1 INLET AT LOW POINT  
(FLAT DITCH)



PLAN 5  
TYPE S-3 INLET AT LOW POINT  
(LOW DITCH)

### DETAILS FOR ROADWAY DITCH INLETS LOCATED WITHIN THE CLEAR ZONE

#### GENERAL NOTES:

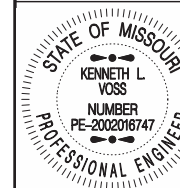
THIS DRAWING IS FOR GENERAL INFORMATION ONLY. ACTUAL CONSTRUCTION DETAILS SHALL CONFORM TO THOSE SHOWN ON THE DETAIL PLANS.

DETAILS ON THIS SHEET ARE ONLY FOR USE WITH STRUCTURES LOCATED IN THE MEDIAN OR WITHIN THE CLEAR ZONE.



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1-888-ASK-MODOT (1-888-275-6636)



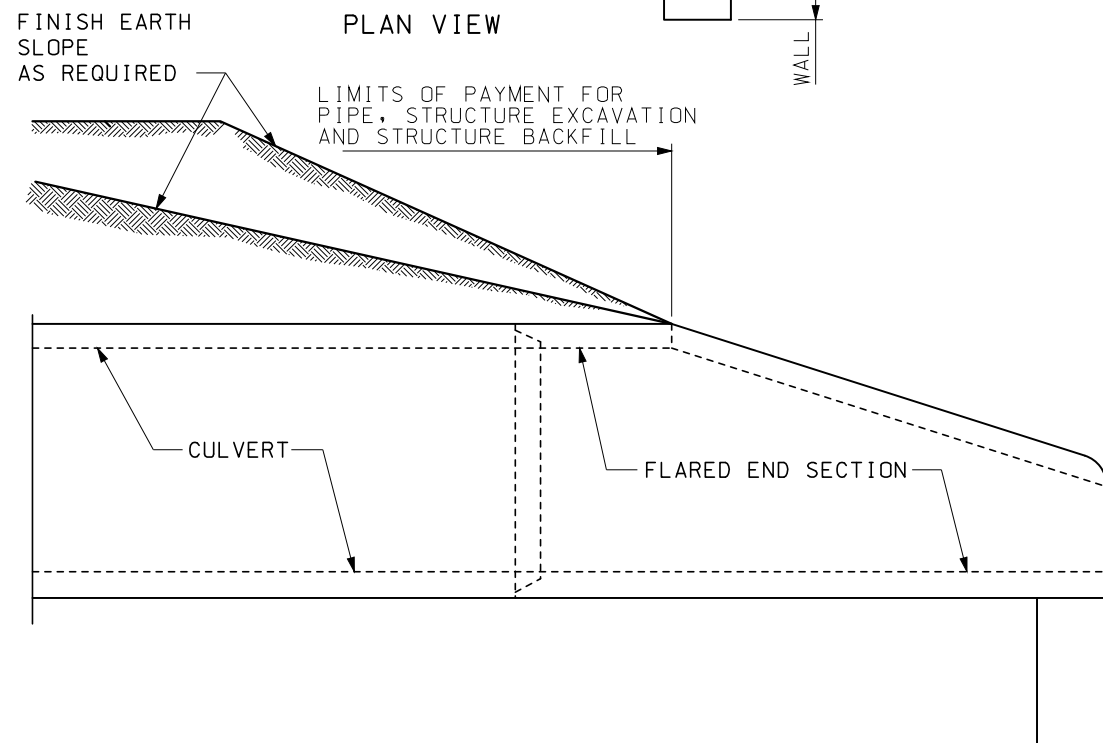
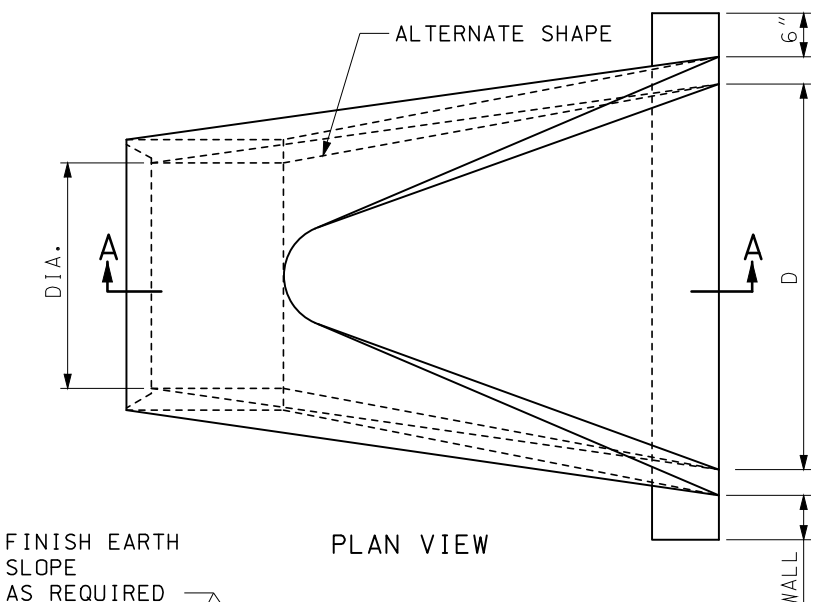
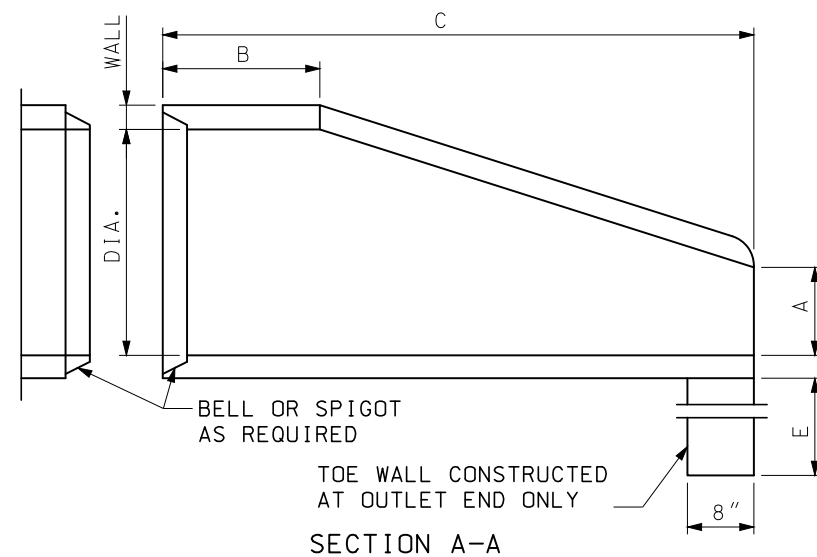
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

### PRECAST DROP INLET TYPICAL LOCATION DETAILS – TYPE S

DATE EFFECTIVE: 1/1/2025  
DATE PREPARED: 10/4/2024

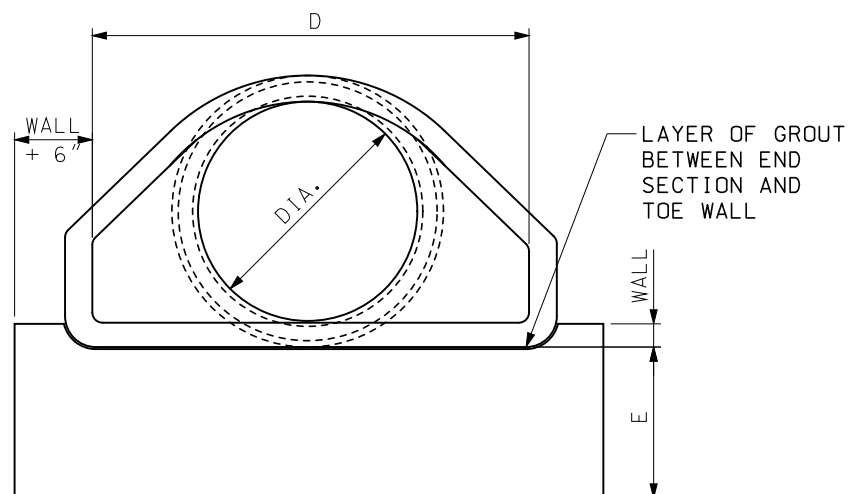
731.10T

SHEET NO.  
8 OF 8



INSTALLATION DETAILS

| DIMENSIONS |        |         |           |           |        |     |
|------------|--------|---------|-----------|-----------|--------|-----|
| DIA.       | WALL   | A       | B<br>MIN. | C<br>MIN. | D      | E   |
| 12"        | 2"     | 4"      | 4'-0"     | 6'        | 2'-0"  | 18" |
| 15"        | 2 1/4" | 6"      | 3'-10"    | 6'        | 2'-6"  | 18" |
| 18"        | 2 1/2" | 9"      | 3'-10"    | 6'        | 3'-0"  | 18" |
| 21"        | 2 3/4" | 9"      | 3'-2"     | 6'        | 3'-6"  | 18" |
| 24"        | 3"     | 9 1/2"  | 2'-6"     | 6'        | 4'-0"  | 24" |
| 27"        | 3 1/4" | 10 1/2" | 2'-1"     | 6'        | 4'-6"  | 24" |
| 30"        | 3 1/2" | 1'-0"   | 1'-7"     | 6'        | 5'-0"  | 24" |
| 33"        | 3 3/4" | 1'-2"   | 1'-7"     | 6'        | 5'-6"  | 24" |
| 36"        | 4"     | 1'-3"   | 2'-10"    | 8'        | 6'-0"  | 24" |
| 42"        | 4 1/2" | 1'-9"   | 2'-11"    | 8'        | 6'-6"  | 24" |
| 48"        | 5"     | 2'-0"   | 2'-2"     | 8'        | 7'-0"  | 24" |
| 54"        | 5 1/2" | 2'-3"   | 2'-11"    | 8'        | 7'-6"  | 36" |
| 60"        | 6"     | 2'-6"   | 3'-3"     | 8'        | 8'-0"  | 36" |
| 66"        | 6 1/2" | 2'-0"   | 1'-9"     | 8'        | 8'-6"  | 36" |
| 72"        | 7"     | 2'-0"   | 2'-9"     | 10'       | 9'-0"  | 36" |
| 78"        | 7 1/2" | 2'-3"   | 2'-3"     | 10'       | 9'-6"  | 36" |
| 84"        | 8"     | 2'-6"   | 2'-0"     | 10'       | 10'-0" | 36" |



END VIEW

| REINFORCEMENT          |                                       |                                       |                                                                         |                                                 |                                               |
|------------------------|---------------------------------------|---------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------|
| ADJOINING<br>PIPE DIA. | BARREL SECTION<br>REINFORCEMENT       |                                       | FLARE SECTION<br>REINFORCEMENT<br>(ONE LAYER ONLY<br>IN CENTER OF WALL) |                                                 |                                               |
|                        | CIRCULAR                              |                                       | ELLIPTICAL                                                              |                                                 |                                               |
|                        | INNER<br>CAGE<br>SQ. IN./<br>LIN. FT. | OUTER<br>CAGE<br>SQ. IN./<br>LIN. FT. | SQ. IN./<br>LIN. FT.                                                    | AREA OF<br>LONGITUDINAL<br>SQ. IN./<br>LIN. FT. | AREA OF<br>TRANSVERSE<br>SQ. IN./<br>LIN. FT. |
| 12"                    | 0.07                                  |                                       |                                                                         | 0.048                                           | 0.048                                         |
| 15"                    | 0.07                                  |                                       |                                                                         | 0.054                                           | 0.054                                         |
| 18"                    | 0.07                                  |                                       | 0.07                                                                    | 0.060                                           | 0.060                                         |
| 21"                    | 0.07                                  |                                       | 0.07                                                                    | 0.066                                           | 0.066                                         |
| 24"                    | 0.07                                  |                                       | 0.07                                                                    | 0.072                                           | 0.072                                         |
| 27"                    | 0.13                                  |                                       | 0.11                                                                    | 0.078                                           | 0.078                                         |
| 30"                    | 0.14                                  |                                       | 0.12                                                                    | 0.084                                           | 0.084                                         |
| 33"                    | 0.15                                  |                                       | 0.13                                                                    | 0.090                                           | 0.090                                         |
| 36"                    | 0.12                                  | 0.09                                  | 0.13                                                                    | 0.096                                           | 0.096                                         |
| 42"                    | 0.15                                  | 0.12                                  | 0.17                                                                    | 0.108                                           | 0.108                                         |
| 48"                    | 0.18                                  | 0.14                                  | 0.20                                                                    | 0.120                                           | 0.120                                         |
| 54"                    | 0.22                                  | 0.16                                  | 0.24                                                                    | 0.132                                           | 0.132                                         |
| 60"                    | 0.25                                  | 0.19                                  | 0.28                                                                    | 0.144                                           | 0.144                                         |
| 66"                    | 0.31                                  | 0.23                                  | 0.34                                                                    | 0.156                                           | 0.156                                         |
| 72"                    | 0.35                                  | 0.21                                  | 0.39                                                                    | 0.170                                           | 0.170                                         |
| 78"                    | 0.40                                  | 0.24                                  | 0.44                                                                    | 0.185                                           | 0.185                                         |
| 84"                    | 0.46                                  | 0.28                                  | 0.51                                                                    | 0.205                                           | 0.205                                         |

GENERAL NOTES:

SLIGHT VARIATIONS IN BOTH SHAPE AND DIMENSIONS FROM THOSE SHOWN MAY BE ACCEPTED IF APPROVED BY THE ENGINEER.

NOT MORE THAN THREE LIFT HOLES MAY BE DRILLED OR CAST IN THE END SECTION FOR HANDLING AND LAYING.

LIFT LUGS OR BARS WILL BE PERMITTED IN PRECAST TOE WALLS.

TOE WALLS MAY BE CAST-IN-PLACE OR PRECAST.

STEEL FIBERS MAY BE USED IN LIEU OF REBAR OR COLD DRAWN STEEL WIRE AS PER SECTION 1032.3.4.



**MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
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**FLARED END SECTION**  
PRECAST CONCRETE

DATE EFFECTIVE: 04/01/2016  
DATE PREPARED: 2/11/2016

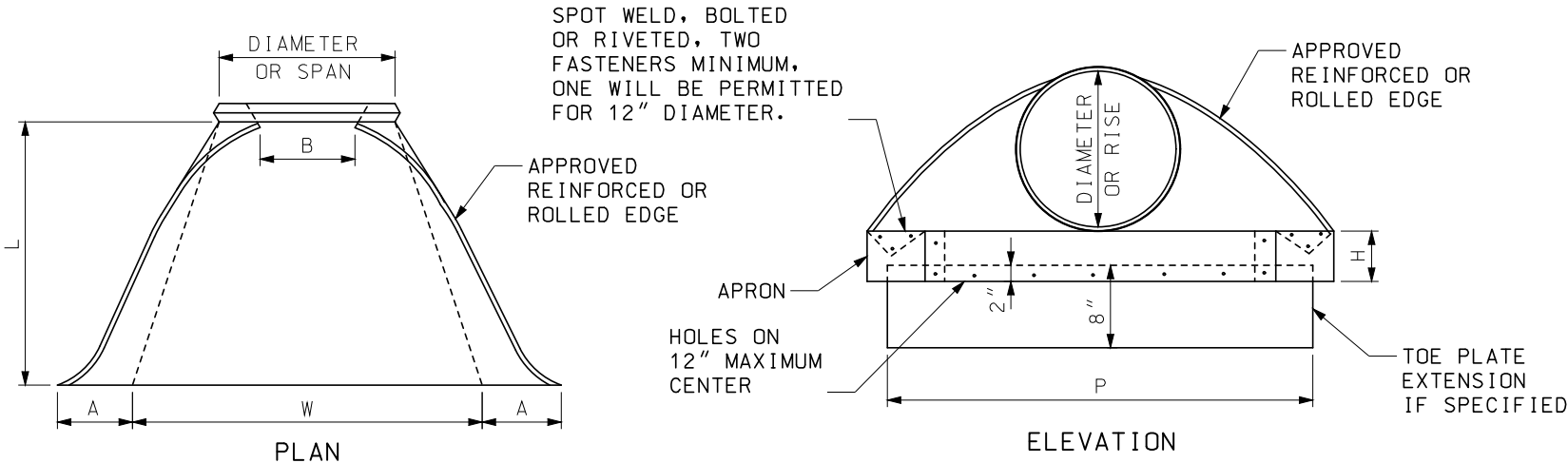
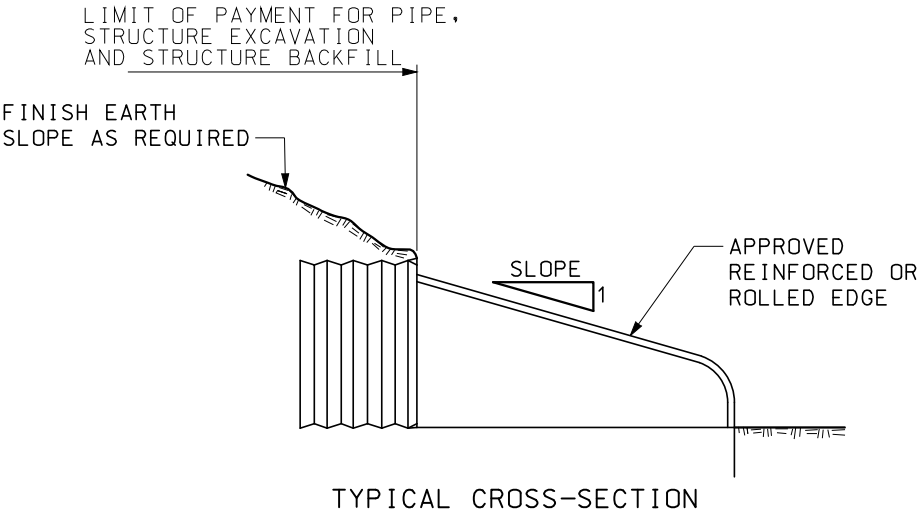
**732.00S**

SHEET NO.  
1 OF 3

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| END SECTIONS FOR ARCH PIPE |                                   |                                             |                                     |                  |           |              |                  |              |                                            |                                       |
|----------------------------|-----------------------------------|---------------------------------------------|-------------------------------------|------------------|-----------|--------------|------------------|--------------|--------------------------------------------|---------------------------------------|
| TYPE                       | ARCH DIMENSIONS<br>SPAN x RISE    | DIAMETER<br>EQUIVALENT<br>ROUND PIPE<br>IN. | GALVANIZED<br>SHEET<br>THICK<br>IN. | DIMENSIONS (IN.) |           |              |                  |              | APPROXIMATE<br>SLOPE<br>(V:H)<br>(1:SLOPE) | TOE PLATE IF<br>SPECIFIED P.<br>(IN.) |
|                            |                                   |                                             |                                     | A<br>1" TOL.     | B<br>MAX. | H<br>1" TOL. | L<br>1 1/2" TOL. | W<br>2" TOL. |                                            |                                       |
| B1                         | SEE<br>STANDARD<br>PLAN<br>725.00 | 15                                          | .064                                | 6                | 9         | 6            | 19               | 30           | 2 1/8                                      | 40                                    |
| B2                         |                                   | 18                                          | .064                                | 7                | 11        | 6            | 23               | 36           | 2                                          | 46                                    |
| B3                         |                                   | 21                                          | .064                                | 8                | 12        | 6            | 28               | 42           | 2 1/8                                      | 52                                    |
| B4                         |                                   | 24                                          | .064                                | 8                | 16        | 6            | 32               | 48           | 2                                          | 58                                    |
| B5                         |                                   | 30                                          | .079                                | 10               | 16        | 6            | 39               | 60           | 1 7/8                                      | 70                                    |
| B6 OR B6A                  |                                   | 36                                          | .079                                | 12               | 18        | 8            | 46               | 75           | 1 3/4                                      | 85                                    |
| B7 OR B7A                  |                                   | 42                                          | .109                                | 13               | 21        | 9            | 53               | 85           | 1 7/8                                      | 107                                   |
| B8 OR B8A                  |                                   | 48                                          | .109                                | 18               | 26        | 12           | 63               | 90           | 1 7/8                                      | 112                                   |
| B9 OR B9A                  |                                   | 54                                          | .109                                | 18               | 30        | 12           | 70               | 102          | 1 7/8                                      | 124                                   |
| B10 OR B10A                |                                   | 60                                          | .109                                | 18               | 33        | 12           | 77               | 114          | 1 7/8                                      | 136                                   |
| B11 OR B11A                |                                   | 66                                          | .109                                | 18               | 36        | 12           | 77               | 126          | 1 5/8                                      | 148                                   |
| B12 OR B12A                |                                   | 72                                          | .109                                | 18               | 39        | 12           | 77               | 138          | 1 1/2                                      | 160                                   |

| END SECTIONS FOR ROUND PIPE |                                       |                  |           |              |                  |              |                                            |                                       |
|-----------------------------|---------------------------------------|------------------|-----------|--------------|------------------|--------------|--------------------------------------------|---------------------------------------|
| PIPE<br>DIAMETER<br>(IN.)   | GALVANIZED<br>SHEET<br>THICK<br>(IN.) | DIMENSIONS (IN.) |           |              |                  |              | APPROXIMATE<br>SLOPE<br>(V:H)<br>(1:SLOPE) | TOE PLATE IF<br>SPECIFIED P.<br>(IN.) |
|                             |                                       | A<br>1" TOL.     | B<br>MAX. | H<br>1" TOL. | L<br>1 1/2" TOL. | W<br>2" TOL. |                                            |                                       |
| 12                          | .064                                  | 6                | 6         | 6            | 21               | 24           | 2 1/2                                      | 34                                    |
| 15                          | .064                                  | 7                | 8         | 6            | 26               | 30           | 2 1/2                                      | 40                                    |
| 18                          | .064                                  | 8                | 10        | 6            | 31               | 36           | 2 1/2                                      | 46                                    |
| 21                          | .064                                  | 9                | 12        | 6            | 36               | 42           | 2 1/2                                      | 52                                    |
| 24                          | .064                                  | 10               | 13        | 6            | 41               | 48           | 2 1/2                                      | 58                                    |
| 30                          | .079                                  | 12               | 16        | 8            | 51               | 60           | 2 1/2                                      | 70                                    |
| 36                          | .079                                  | 14               | 19        | 9            | 60               | 72           | 2 1/2                                      | 94                                    |
| 42                          | .109                                  | 16               | 22        | 11           | 69               | 84           | 2 1/2                                      | 106                                   |
| 48                          | .109                                  | 18               | 27        | 12           | 78               | 90           | 2 1/2                                      | 112                                   |
| 54                          | .109                                  | 18               | 30        | 12           | 84               | 102          | 2 OR 2 1/4                                 | 124                                   |
| 60                          | .109                                  | 18               | 33        | 12           | 87               | 114          | 1 3/4 OR 2                                 | 136                                   |
| 66                          | .109                                  | 18               | 36        | 12           | 87               | 120          | 1 1/2 OR 2                                 | 144                                   |
| 72                          | .109                                  | 18               | 39        | 12           | 87               | 126          | 1 1/3 OR 2                                 | 148                                   |
| 78                          | .109                                  | 18               | 42        | 12           | 87               | 132          | 1 1/4 OR 1 1/2                             | 154                                   |
| 84                          | .109                                  | 18               | 45        | 12           | 87               | 138          | 1 1/6 OR 1 1/2                             | 160                                   |



END SECTION FOR PIPE AND PIPE ARCH

GENERAL NOTES:

MINOR VARIATIONS OF DETAIL AND DIMENSIONS WILL BE ACCEPTED TO PERMIT THE USE OF A MANUFACTURER’S STANDARD METHODS OF FABRICATION.

END SECTIONS FABRICATED FROM THICKER METAL THAN INDICATED WILL BE ACCEPTED.

ALL BOLTS SHALL BE 3/8" DIAMETER AND GALVANIZED, UNLESS OTHERWISE SHOWN.

TOE PLATE EXTENSIONS, IF SPECIFIED, SHALL HAVE HOLES TO MATCH HOLES IN TOE PLATE.

SKIRT SECTION IS DEFINED AS THE FLARED PORTION OF THE END SECTION INCLUDING SIDE AND BOTTOM (CENTER) PANELS AND APRON.

SKIRT SECTION FOR 12" THROUGH 24" PIPES SHALL BE MADE IN ONE PIECE.

SKIRT SECTIONS FOR 30" AND LARGER PIPES AND B5 AND LARGER PIPE ARCHES MAY BE MADE FROM UP TO 2 SHEETS JOINED BY RIVETING OR BOLTING ON CENTERLINE.

SKIRT SECTIONS FROM 48" AND LARGER PIPES AND B8 OR LARGER PIPE ARCHES MAY BE MADE FROM UP TO 3 SHEETS JOINED BY RIVETING OR BOLTING EQUAL DISTANCE FROM CENTERLINE.

SKIRT SECTIONS FOR 72" AND LARGER PIPES MAY BE MADE FROM UP TO 4 SHEETS JOINED BY RIVETING AND BOLTING. THE BOTTOM PANEL SHALL BE 2 EQUAL WIDTH SHEETS JOINED ON CENTERLINE.

ALL 3 PIECE AND 4 PIECE SKIRTS FOR 60" OR LARGER PIPES AND B10 AND LARGER PIPE ARCHES SHALL HAVE 0.109" THICK SIDES AND 0.138" THICK BOTTOM (CENTER) PANELS. WIDTH OF BOTTOM PANELS SHALL BE GREATER THAN 20% OF THE PIPE PERIPHERY CONNECTOR SECTIONS. CORNER PLATES AND TOE PLATES SHALL BE GALVANIZED AND OF THE SAME OR GREATER THICKNESS AS THE SKIRT.

SEE SHEET 3 OF 3 FOR CONNECTION DETAILS

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
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FLARED END SECTION  
METAL

DATE EFFECTIVE: 04/01/2016  
DATE PREPARED: 2/11/2016

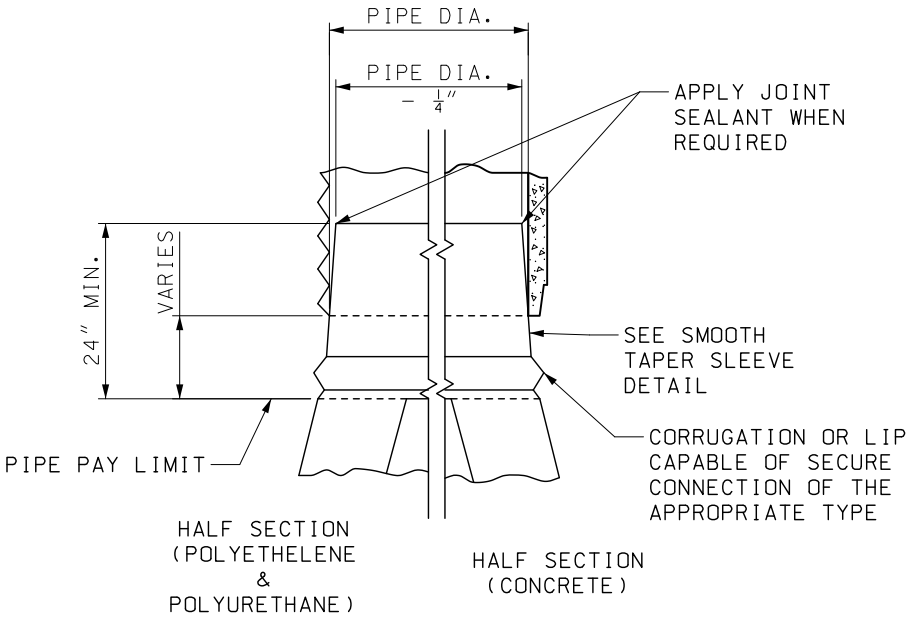
732.00S

SHEET NO.  
2 OF 3

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

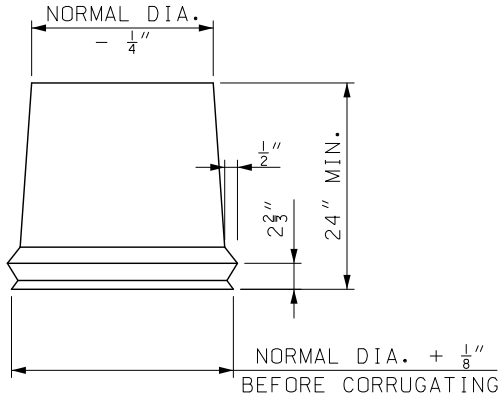


| CONNECTION REQUIREMENTS  |                 |                             |                            |         |       |
|--------------------------|-----------------|-----------------------------|----------------------------|---------|-------|
| TYPE                     | CONNECTION TYPE | ALLOWABLE SIZE RANGE (IN. ) | TAPERED SLEEVE REQUIREMENT |         |       |
|                          |                 |                             | CMP                        | RCP PVC | PP PE |
| SAFETY END SECTION       | 2               | ALL                         | N                          | Y       | Y     |
| METAL FLARED END SECTION | 1               | 12-24                       | N                          | Y       | N     |
|                          | 2               | ALL                         | N                          | Y       | N     |
|                          | 3               | ALL                         | N                          | Y       | N     |
|                          | 4               | 12-24                       | N                          | Y       | N     |
|                          | 5               | 12-24                       | N                          | Y       | N     |



TAPERED SLEEVE CONNECTION FOR CONCRETE AND THERMOPLASTIC PIPE

TAPERED SLEEVE SHALL BE FIRMLY WEDGED INTO PIPE END BEFORE BACKFILLING PIPE PAY LENGTH.



FORM 1/2" X 2 3/8" CORRUGATIONS. MAINTAIN INSIDE DIAMETER OF SLEEVE. FINISHED END TO BE THE SAME DIAMETER AS CORRUGATED STEEL PIPE DIAMETER. SMOOTH TAPERED SLEEVE DETAIL

GENERAL NOTES:

MINOR VARIATIONS OF DETAIL AND DIMENSIONS WILL BE ACCEPTED TO PERMIT THE USE OF A MANUFACTURER'S STANDARD METHODS OF FABRICATION.

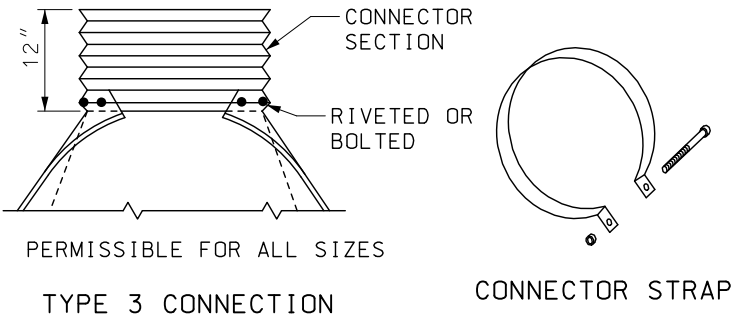
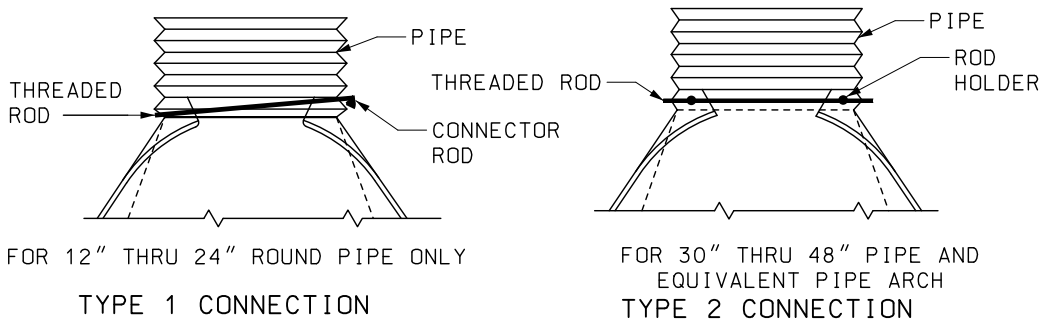
TAPERED SLEEVES SHALL BE FABRICATED FROM SMOOTH 12 GAUGE STEEL COATED IN ACCORDANCE WITH AASHTO M-218.

TAPERED SLEEVES SHALL BE FIRMLY WEDGED INTO THE PIPE END BEFORE BACKFILLING PIPE PAY LENGTH.

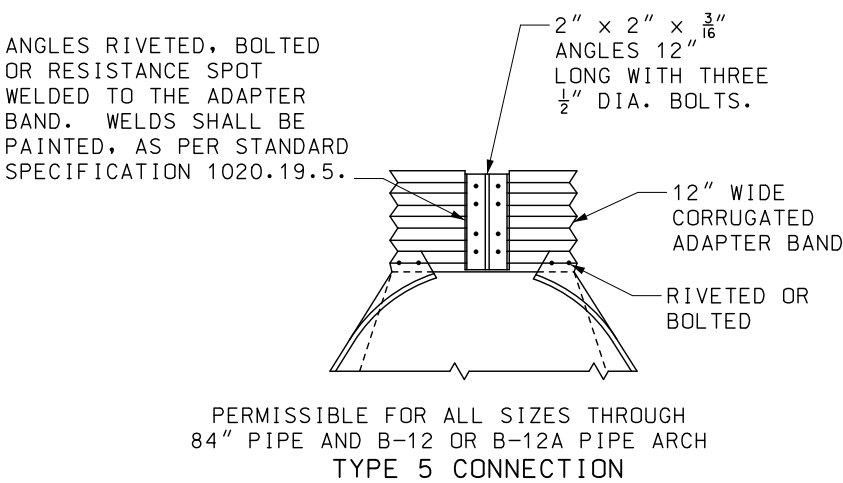
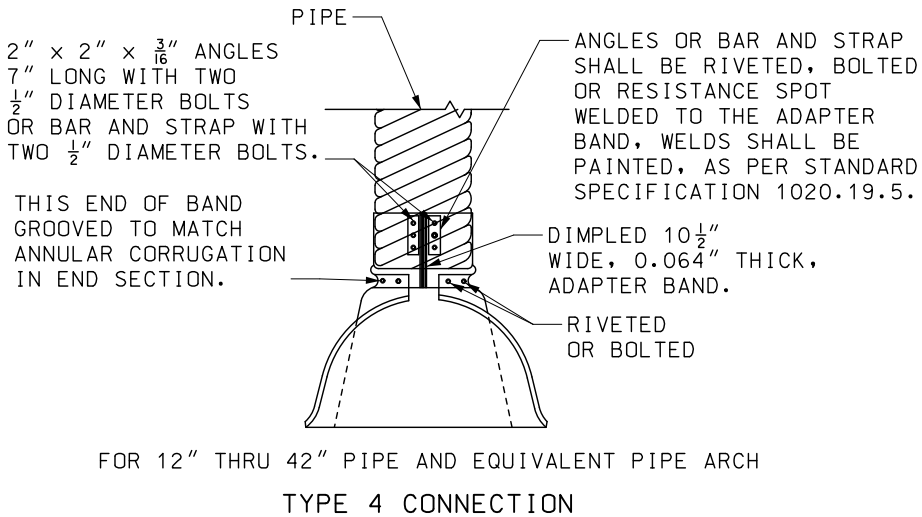
THE LENGTH OF TAPERED SLEEVE SHALL BE SIZED TO PROTECT UV SENSITIVE PIPE MATERIALS FROM SUNLIGHT. THE ENTIRE COST OF THE TAPERED SLEEVE, HARDWARE, AND INSTALLATION SHALL BE INCLUDED IN THE COST OF THE PIPE.

TAPERED SLEEVES SHALL HAVE AT A MINIMUM A HALF CORRUGATION OR LIP DESIGNED TO PROVIDE A SECURE CONNECTION WITH THE END SECTION.

ANY ROD OR STRAP USED FOR MAKING A CONNECTION SHALL BE SECURLY SEATED INTO A VALLEY OF THE PIPE CORRUGATION. THE VALLEY CHOSEN TO HOLD THE ROD OR STRAP SHALL LEAVE AT LEAST ONE FULL INTACT CORRUGATION BEFORE THE END OF THE PIPE. THE FEMALE PORTION OF A BELL END SHALL NOT COUNT AS A FULL INTACT CORRUGATION.



1 INCH WIDE, 0.109" THICK CONNECTOR STRAP OF COMMERCIAL QUALITY STEEL, GALVANIZED WITH SAME WEIGHT COATING AS PIPE, AND 6" X 1/2" GALVANIZED BAND BOLT AND NUT. USE AS ALTERNATE ON TYPE 1 CONNECTION ONLY.



END SECTION FOR PIPE AND PIPE ARCH



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

FLARED END SECTION

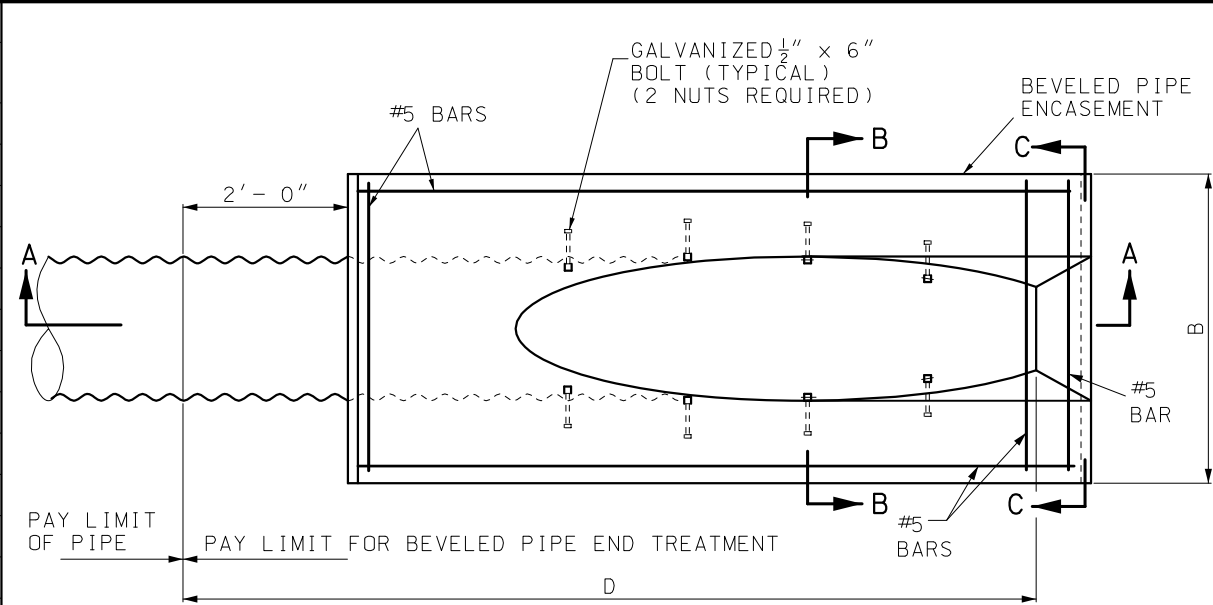
METAL

DATE EFFECTIVE: 07/01/2021  
DATE PREPARED: 4/29/2021

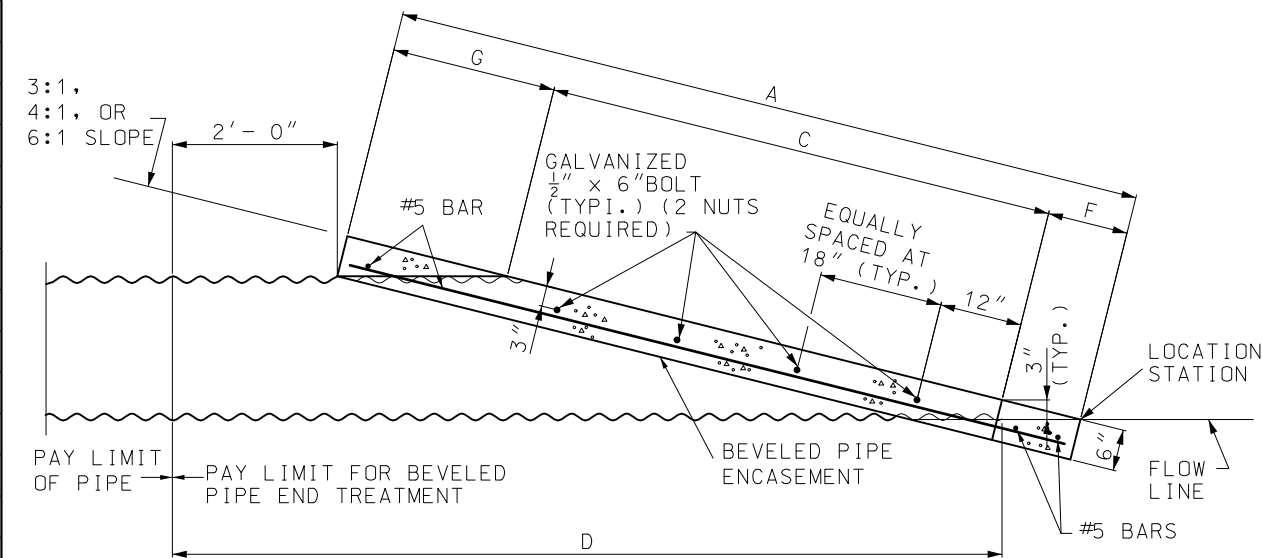
732.00S

SHEET NO.  
3 OF 3

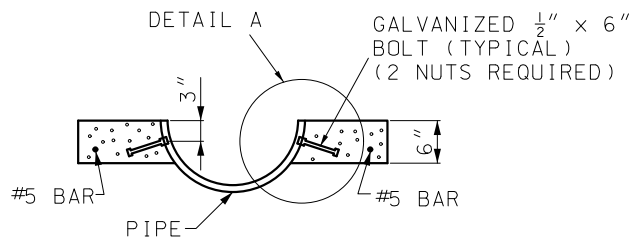
| BEVELED PIPE ENCASEMENT DETAILS |       |          |       |          |         |    |      |     |
|---------------------------------|-------|----------|-------|----------|---------|----|------|-----|
| PIPE DIAMETER                   | SLOPE | A        | B     | C        | D       | E  | F    | G   |
| 15"                             | 3:1   | 5'-5½"   | 3'-3" | 3'-2"    | 6'-7"   | 1  | 9½"  | 18" |
|                                 | 4:1   | 7'-2"    |       | 4'-1½"   | 8'-1¼"  | 2  | 12½" | 24" |
|                                 | 6:1   | 10'-7¼"  |       | 6'-1"    | 11'-1½" | 3  | 18¼" | 36" |
| 18"                             | 3:1   | 6'-3"    | 3'-6" | 3'-11½"  | 7'-4"   | 2  | 9½"  | 18" |
|                                 | 4:1   | 8'-2¼"   |       | 5'-1¾"   | 9'-1"   | 3  | 12½" | 24" |
|                                 | 6:1   | 12'-1½"  |       | 7'-7¼"   | 12'-7½" | 4  | 18¼" | 36" |
| 21"                             | 3:1   | 7'-½"    | 3'-9" | 4'-9"    | 8'-1"   | 3  | 9½"  | 18" |
|                                 | 4:1   | 9'-2¾"   |       | 6'-2¼"   | 10'-1¼" | 3  | 12½" | 24" |
|                                 | 6:1   | 13'-7¾"  |       | 9'-1½"   | 14'-1½" | 5  | 18¼" | 36" |
| 24"                             | 3:1   | 7'-10"   | 4'-0" | 5'-6½"   | 8'-10"  | 3  | 9½"  | 18" |
|                                 | 4:1   | 10'-3"   |       | 7'-2½"   | 11'-1"  | 4  | 12½" | 24" |
|                                 | 6:1   | 15'-2"   |       | 10'-7¾"  | 15'-7½" | 6  | 18¼" | 36" |
| 27"                             | 3:1   | 8'-7½"   | 4'-3" | 6'-4"    | 9'-7"   | 4  | 9½"  | 18" |
|                                 | 4:1   | 11'-3½"  |       | 8'-3"    | 12'-1¼" | 5  | 12½" | 24" |
|                                 | 6:1   | 16'-8¼"  |       | 12'-2"   | 17'-1½" | 7  | 18¼" | 36" |
| 30"                             | 3:1   | 9'-5"    | 4'-6" | 7'-1½"   | 10'-4"  | 4  | 9½"  | 18" |
|                                 | 4:1   | 12'-3¾"  |       | 9'-3¼"   | 13'-1"  | 6  | 12½" | 24" |
|                                 | 6:1   | 18'-2½"  |       | 13'-8¼"  | 18'-7½" | 8  | 18¼" | 36" |
| 33"                             | 3:1   | 10'-2¼"  | 4'-9" | 7'-10¾"  | 11'-¾"  | 5  | 9½"  | 18" |
|                                 | 4:1   | 13'-4¼"  |       | 10'-3¾"  | 14'-1¼" | 6  | 12½" | 24" |
|                                 | 6:1   | 19'-8¾"  |       | 15'-2½"  | 20'-1½" | 9  | 18¼" | 36" |
| 36"                             | 3:1   | 10'-11¾" | 5'-0" | 8'-8¼"   | 11'-10" | 5  | 9½"  | 18" |
|                                 | 4:1   | 14'-4½"  |       | 11'-4"   | 15'-1"  | 7  | 12½" | 24" |
|                                 | 6:1   | 21'-3"   |       | 16'-8¾"  | 21'-7½" | 10 | 18¼" | 36" |
| 42"                             | 3:1   | 12'-6¾"  | 5'-6" | 10'-3¼"  | 13'-4"  | 6  | 9½"  | 18" |
|                                 | 4:1   | 16'-5¼"  |       | 13'-4¾"  | 17'-1¼" | 8  | 12½" | 24" |
|                                 | 6:1   | 24'-3½"  |       | 19'-9¼"  | 24'-7½" | 13 | 18¼" | 36" |
| 48"                             | 3:1   | 14'-1¾"  | 6'-0" | 11'-10¼" | 14'-10" | 7  | 9½"  | 18" |
|                                 | 4:1   | 18'-6"   |       | 15'-5½"  | 19'-1¼" | 10 | 12½" | 24" |
|                                 | 6:1   | 27'-4"   |       | 22'-9¾"  | 27'-7½" | 15 | 18¼" | 36" |
| 54"                             | 3:1   | 15'-8¾"  | 6'-6" | 13'-5¼"  | 16'-4"  | 8  | 9½"  | 18" |
|                                 | 4:1   | 20'-6¾"  |       | 17'-6¼"  | 21'-1¼" | 11 | 12½" | 24" |
|                                 | 6:1   | 30'-4½"  |       | 25'-10¼" | 30'-7½" | 17 | 18¼" | 36" |
| 60"                             | 3:1   | 17'-3¾"  | 7'-0" | 15'-¼"   | 17'-10" | 9  | 9½"  | 18" |
|                                 | 4:1   | 22'-7½"  |       | 19'-7"   | 23'-1¼" | 12 | 12½" | 24" |
|                                 | 6:1   | 33'-5"   |       | 28'-10¾" | 33'-7½" | 19 | 18¼" | 36" |



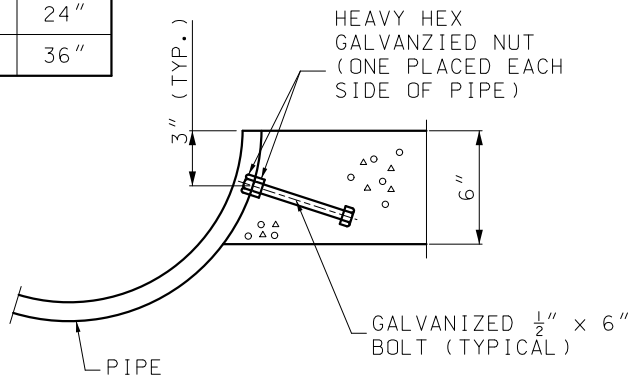
PLAN VIEW FOR HIGHWAYS



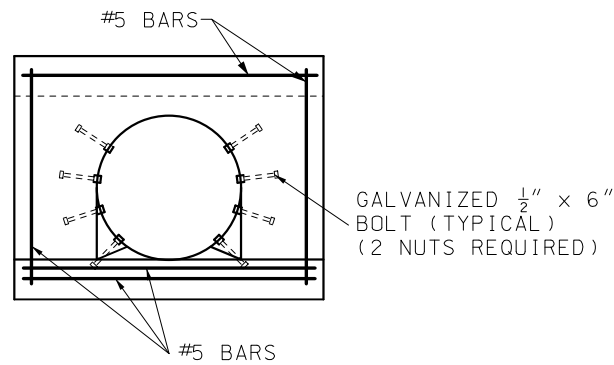
SECTION A-A



SECTION B-B



DETAIL A



SECTION C-C

GENERAL NOTES:

CONCRETE USED IN CONSTRUCTION OF THE BEVELED PIPE ENCASEMENT SHALL BE CLASS B CONCRETE OR AN APPROVED COMMERCIAL MIX MEETING REQUIREMENTS OF SECTION 501 OF THE STANDARD SPECIFICATIONS.

REINFORCING STEEL USED IN CONSTRUCTION OF THE BEVELED PIPE ENCASEMENT SHALL MEET THE REQUIREMENTS OF SECTION 1036 OF THE STANDARD SPECIFICATIONS.

BEVELED PIPE ENCASEMENT MAY BE USED WITH EITHER POLYETHYLENE OR CORRUGATED METALLIC COATED STEEL PIPE.

THE PRICE BID PER EACH FOR "BEVELED PIPE END TREATMENT" SHALL BE CONSIDERED FULL COMPENSATION FOR FURNISHING ALL MATERIALS AND INSTALLATION OF THE BEVELED PIPE SECTION AND BEVELED PIPE ENCASEMENT AS SHOWN OR AS DIRECTED BY THE ENGINEER.

THE ½" x 6" BOLT AND NUTS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 (ASTM A153), CLASS C SPECIFICATIONS. LOW CARBON STEEL ANCHOR BOLTS SHALL BE ASTM F1554, GRADE 36.

BEVELED PIPE SHALL BE DRILLED AT LOCATIONS SHOWN ON PLANS FOR PLACEMENT OF ½" x 6" GALVANIZED BOLTS. THE ½" x 6" GALVANIZED BOLTS SHALL BE "DOUBLE NUTTED" AS SHOWN AND PLACED IN THE VALLEY OF PIPE CORRUGATIONS.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER  
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

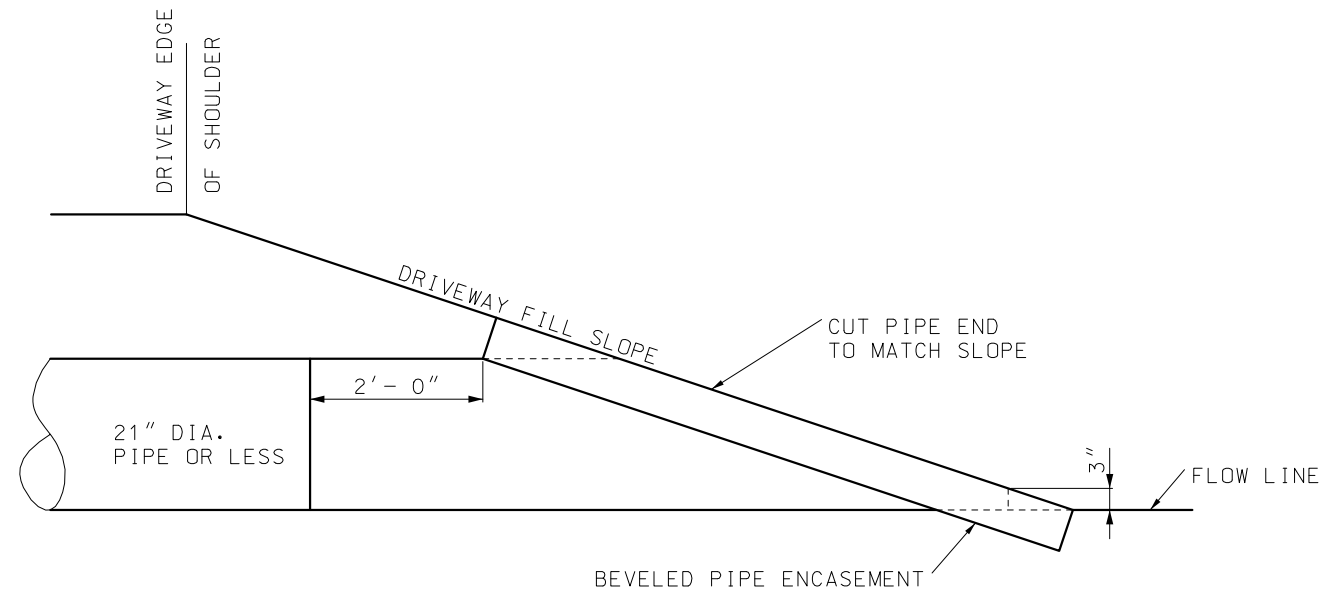
BEVELED PIPE END TREATMENT FOR HIGHWAYS

DATE EFFECTIVE: 01/01/2021  
DATE PREPARED: 10/14/2020

732.05D

SHEET NO. 1 OF 2

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



PIPE END DETAILS FOR PARALLEL DRAINAGE STRUCTURES FOR DRIVEWAYS  
(SINGLE PIPE INSTALLATION)

NOTE:

FOR MULTIPLE PIPE INSTALLATIONS, END SECTIONS WITH SAFETY BARS SYSTEM OR OPTIONAL BAR GATE SYSTEM SHALL BE PROVIDED. SEE STANDARD PLAN 732.10.

SEE DRIVEWAY STANDARD PLANS FOR BEVELED END SECTION REQUIREMENTS.

GENERAL NOTES:

CONCRETE USED IN CONSTRUCTION OF THE BEVELED PIPE ENCASEMENT SHALL BE CLASS B CONCRETE OR AN APPROVED COMMERCIAL MIX MEETING REQUIREMENTS OF SECTION 501 OF THE STANDARD SPECIFICATIONS.

REINFORCING STEEL USED IN CONSTRUCTION OF THE BEVELED PIPE ENCASEMENT SHALL MEET THE REQUIREMENTS OF SECTION 1036 OF THE STANDARD SPECIFICATIONS.

BEVELED PIPE ENCASEMENT MAY BE USED WITH EITHER POLYETHYLENE OR CORRUGATED METALLIC COATED STEEL PIPE.

THE PRICE BID PER EACH FOR "BEVELED PIPE END TREATMENT" SHALL BE CONSIDERED FULL COMPENSATION FOR FURNISHING ALL MATERIALS AND INSTALLATION OF THE BEVELED PIPE SECTION AND BEVELED PIPE ENCASEMENT AS SHOWN OR AS DIRECTED BY THE ENGINEER.

THE  $\frac{1}{2}$ " x 6" BOLT AND NUTS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 (ASTM A153), CLASS C SPECIFICATIONS. LOW CARBON STEEL ANCHOR BOLTS SHALL BE ASTM F1554, GRADE 36.

BEVELED PIPE SHALL BE DRILLED AT LOCATIONS SHOWN ON PLANS FOR PLACEMENT OF  $\frac{1}{2}$ " x 6" GALVANIZED BOLTS. THE  $\frac{1}{2}$ " x 6" GALVANIZED BOLTS SHALL BE "DOUBLE NUTTED" AS SHOWN AND PLACED IN THE VALLEY OF PIPE CORRUGATIONS.



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STATE OF MISSOURI

TRAVIS D. KOESTNER

NUMBER PE-30042

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

BEVELED PIPE END TREATMENT FOR DRIVEWAYS

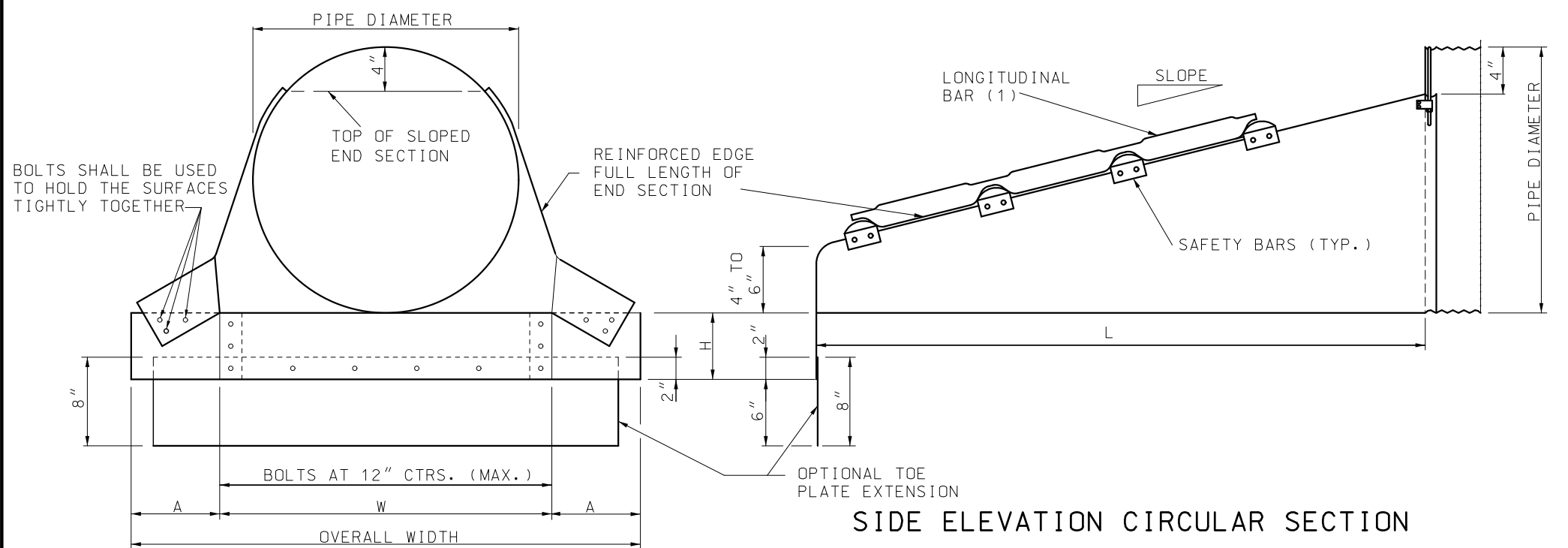
DATE EFFECTIVE: 01/01/2021

DATE PREPARED: 10/14/2020

732.05D

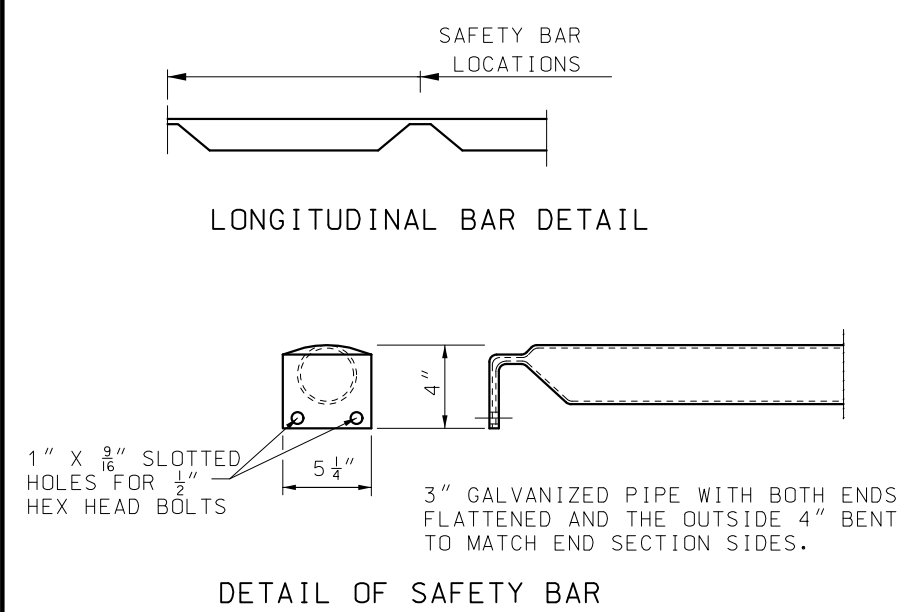
SHEET NO. 2 OF 2

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



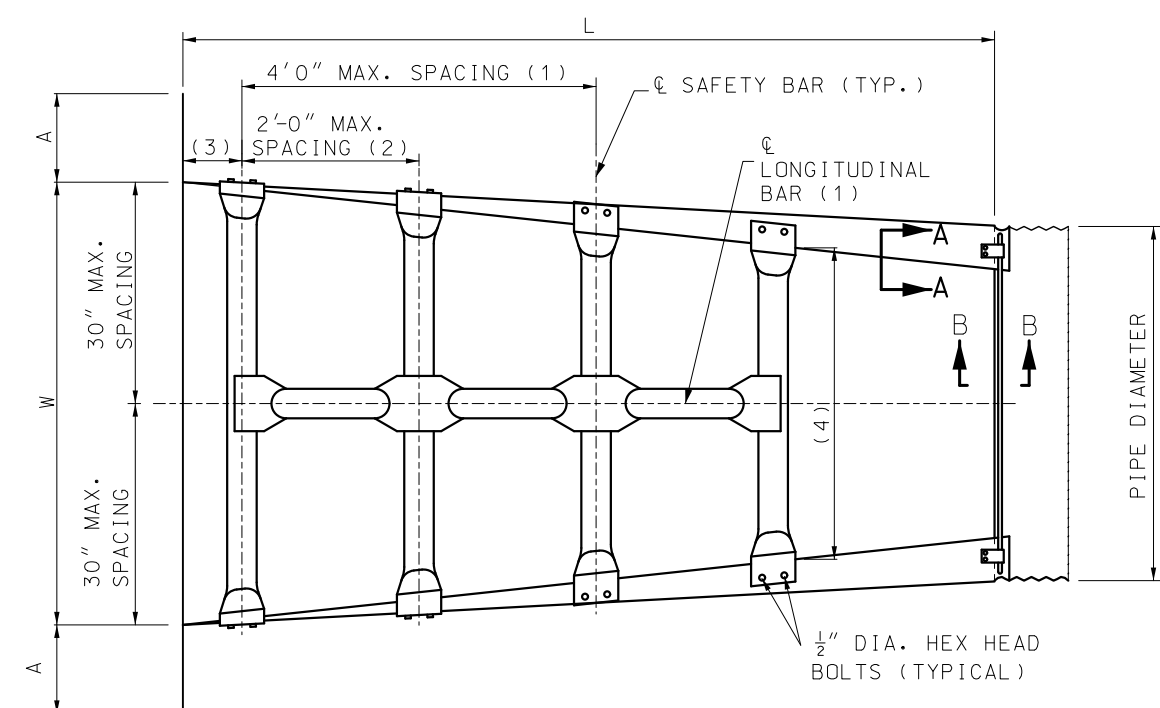
FRONT VIEW CIRCULAR PIPE

SIDE ELEVATION CIRCULAR SECTION

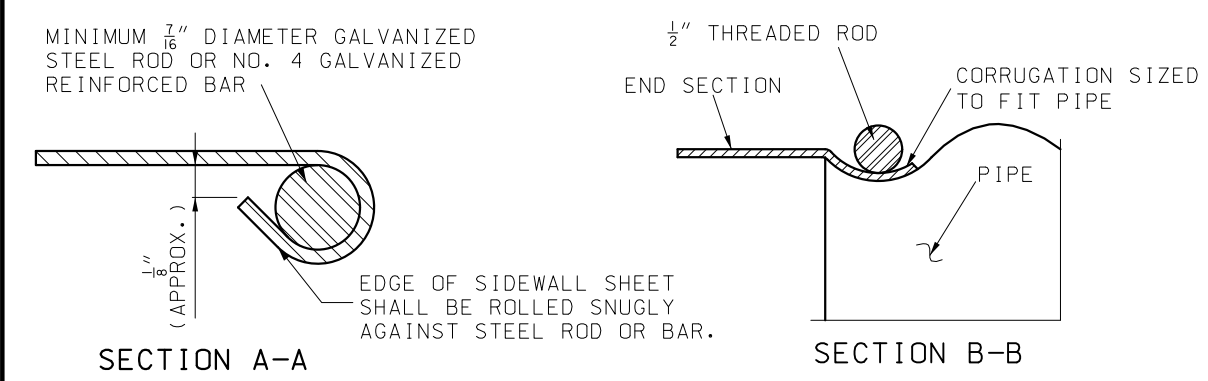


LONGITUDINAL BAR DETAIL

DETAIL OF SAFETY BAR



TOP VIEW CIRCULAR SECTION



SECTION A-A

SECTION B-B

LONGITUDINAL BAR, WHEN REQUIRED, SHALL BE WELDED TO SAFETY BARS TO FORM SINGLE GRATE STRUCTURE. LONGITUDINAL BAR IS NOT TO BE USED FOR PARALLEL DRAINAGE STRUCTURES.

- NOTES:
- (1) FOR CROSSROAD DRAINAGE STRUCTURES ONLY.
  - (2) FOR PARALLEL DRAINAGE STRUCTURES ONLY.
  - (3) 4" TO 6" MINIMUM
  - (4) SAFETY BARS SHALL BE PROVIDED UNTIL THE LATERAL SPAN OF THE OPENING IS LESS THAN OR EQUAL TO 30".

GENERAL NOTES:

END SECTIONS, INCLUDING ALL BOLTS, NUTS, RODS AND STRAPS, SHALL BE FABRICATED FROM GALVANIZED STEEL MEETING THE REQUIREMENTS OF SECTION 1020.

ALL BOLTS UNLESS OTHERWISE SHOWN SHALL BE ASTM A307 BOLTS.

WHEN REQUIRED, OPTIONAL TOE PLATE EXTENSION SHALL BE PUNCHED OR DRILLED AND BOLTED TO END SECTION TOE PLATE, STEEL FOR TOE PLATE EXTENSION SHALL BE SAME GAUGE AS END SECTION. DIMENSIONS SHALL BE OVERALL WIDTH LESS 6" BY 8" HIGH.

ATTACHMENT TO CIRCULAR PIPES 15" THROUGH 24" DIAMETER SHALL BE MADE WITH TYPE #1 STRAPS. ALL OTHER SIZES SHALL BE ATTACHED WITH TYPE #2 CONNECTORS.

SAFETY BARS AND LONGITUDINAL BARS SHALL BE FABRICATED FROM STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A-53 SCHEDULE 40 SPECIFICATIONS. SAFETY BARS AND LONGITUDINAL BARS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 1020 OF STANDARD SPECIFICATIONS.

INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 725 AND 732 OF THE STANDARD SPECIFICATIONS.

SLOTTED HOLES FOR SAFETY BAR ATTACHMENT SHALL BE PROVIDED FOR ALL END SECTIONS.

MINOR VARIATIONS OF DETAIL WILL BE ACCEPTED TO PERMIT THE USE OF A MANUFACTURER'S STANDARD METHODS OF FABRICATION.

END SECTIONS FABRICATED FROM THICKER METAL THAN INDICATED WILL BE ACCEPTED.

ALL BOLTS SHALL BE 3/8" DIAMETER AND GALVANIZED, UNLESS OTHERWISE SHOWN.

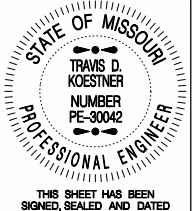
SKIRT SECTION IS DEFINED AS THE FLARED PORTION OF THE END SECTION INCLUDING SIDE AND BOTTOM (CENTER) PANELS AND APRON.

SKIRT SECTION FOR 12" TROUGH 24" PIPES SHALL BE MADE IN ONE PIECE.

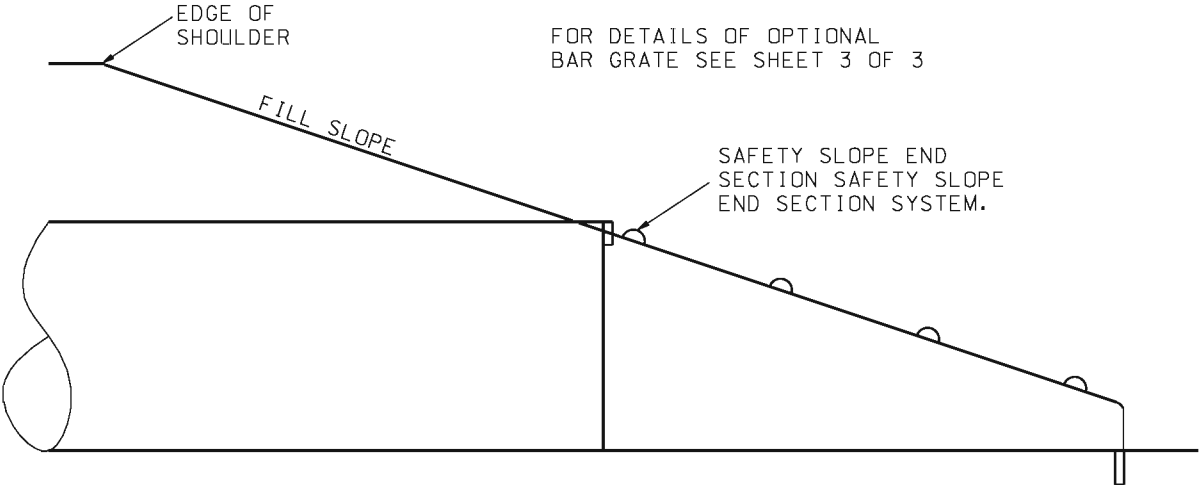
SKIRT SECTIONS FOR 30" AND LARGER PIPES MAY BE MADE FROM UP TO 2 SHEETS JOINED BY RIVETING OR BOLTING ON CENTERLINE.

SKIRT SECTIONS FROM 48" AND LARGER PIPES MAY BE MADE FROM UP TO 3 SHEETS JOINED BY RIVETING OR BOLTING EQUAL DISTANCE FROM CENTERLINE.

ALL 3 PIECE SKIRTS FOR 60" PIPES SHALL HAVE 0.109" THICK SIDES AND 0.138" THICK BOTTOM (CENTER) PANELS. WIDTH OF BOTTOM PANELS SHALL BE GREATER THAN 20% OF THE PIPE PERIPHERY CONNECTOR SECTION. CORNER PLATES AND TOE PLATES SHALL BE GALVANIZED AND OF THE SAME OR GREATER THICKNESS AS THE SKIRT.

|                                                                                                                                              |                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                     |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                     |
|                                                         | <b>SAFETY SLOPE<br/>END SECTION</b> |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                      | <b>732.10H</b>                      |
| SHEET NO.<br>1 OF 3                                                                                                                          |                                     |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



PIPE END DETAILS FOR DRAINAGE STRUCTURES  
(SINGLE PIPE INSTALLATION)

NOTE:  
SEE DRIVEWAY STANDARD PLANS FOR  
BEVELED END SECTION REQUIREMENT.  
  
FOR CONNECTION DETAILS, SEE 732.00  
SHEET 3 OF 3.

| METAL END SECTIONS FOR CIRCULAR PIPES |                                    |                               |                      |         |         |               |              |              |       |              |       |              |
|---------------------------------------|------------------------------------|-------------------------------|----------------------|---------|---------|---------------|--------------|--------------|-------|--------------|-------|--------------|
| PIPE DIA.<br>(IN.)                    | MIN. GAUGE ENDS (IN.)<br>4:1 & 6:1 | MIN. GAUGE ENDS (IN.)<br>10:1 | DIMENSIONS IN INCHES |         |         |               | L DIMENSIONS |              |       |              |       |              |
|                                       |                                    |                               | A                    | H       | W       | OVERALL WIDTH | SLOPE        | LENGTH (IN.) | SLOPE | LENGTH (IN.) | SLOPE | LENGTH (IN.) |
|                                       |                                    |                               | 1" TOL.              | 1" TOL. | 2" TOL. |               |              |              |       |              |       |              |
| 15                                    | 16                                 | 12                            | 8                    | 6       | 21      | 37            | 4:1          | 20           | 6:1   | 30           | 10:1  | 70           |
| 18                                    | 16                                 | 12                            | 8                    | 6       | 24      | 40            | 4:1          | 32           | 6:1   | 48           | 10:1  | 100          |
| 21                                    | 16                                 | 12                            | 8                    | 6       | 27      | 43            | 4:1          | 44           | 6:1   | 66           | 10:1  | 130          |
| 24                                    | 16                                 | 12                            | 8                    | 6       | 30      | 46            | 4:1          | 56           | 6:1   | 84           | 10:1  | 160          |
| 30                                    | 12                                 |                               | 12                   | 9       | 36      | 60            | 4:1          | 80           | 6:1   | 120          | 10:1  | 220          |
| 36                                    | 12                                 |                               | 12                   | 9       | 42      | 66            | 4:1          | 104          | 6:1   | 156          | 10:1  | 280          |
| 42                                    | 12                                 |                               | 16                   | 12      | 48      | 80            | 4:1          | 128          | 6:1   | 192          |       |              |
| 48                                    | 12                                 |                               | 16                   | 12      | 54      | 86            | 4:1          | 152          | 6:1   | 228          |       |              |
| 54                                    | 12                                 |                               | 16                   | 12      | 60      | 92            | 4:1          | 176          | 6:1   | 264          |       |              |
| 60                                    | 12                                 |                               | 16                   | 12      | 66      | 98            | 4:1          | 200          | 6:1   | 300          |       |              |



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

KATHRYN PHILLIPS HARVEY

NUMBER PE-23751

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

DATE EFFECTIVE: 06/01/2013  
DATE PREPARED: 4/1/2013

732.10H

SHEET NO.  
2 OF 3

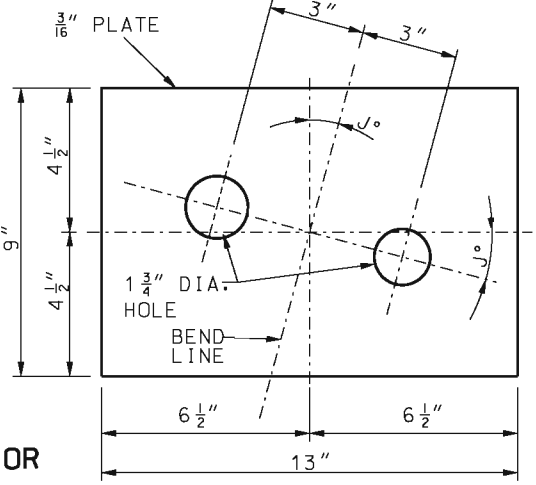
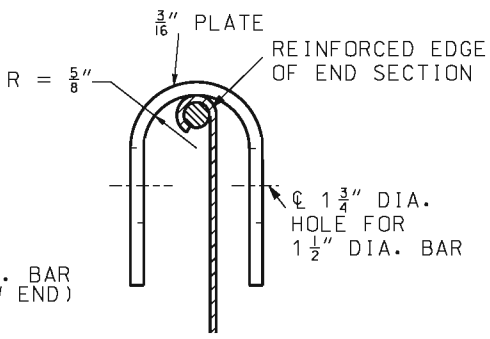
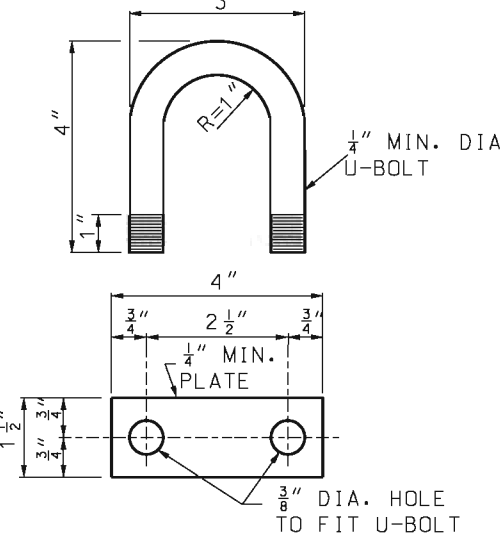
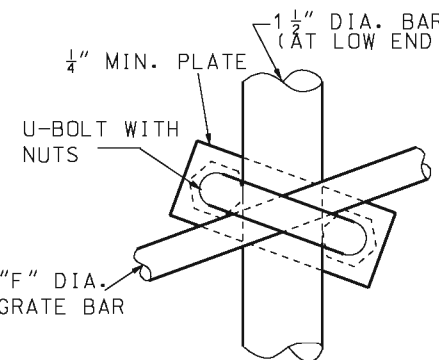
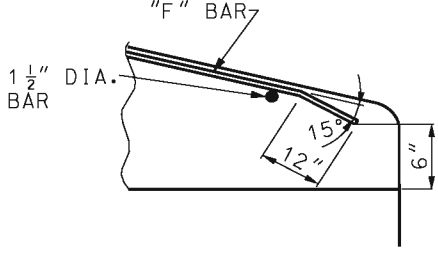
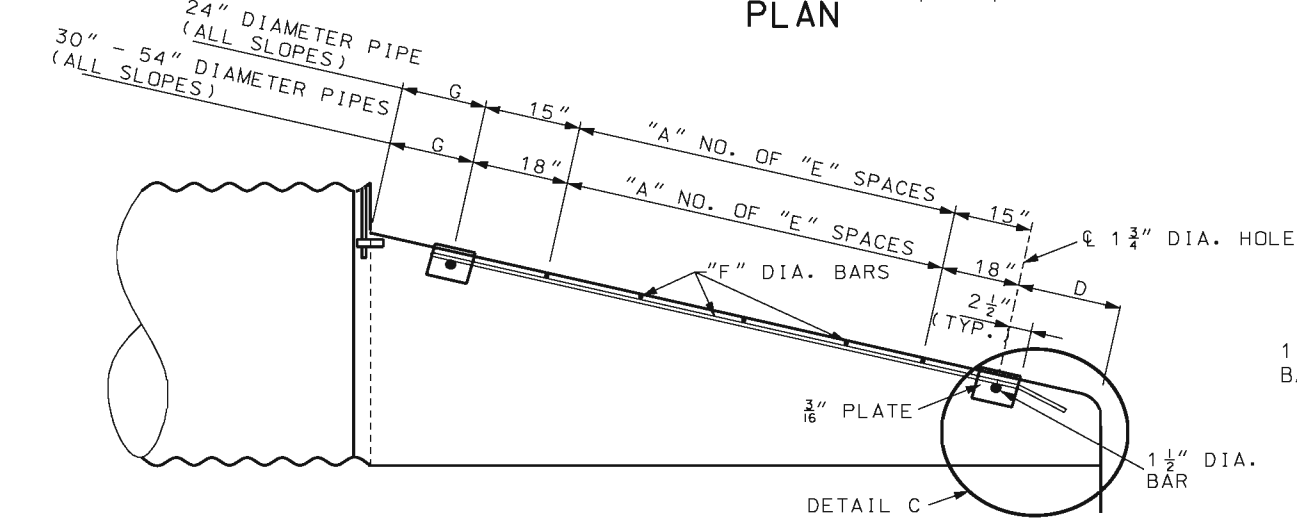
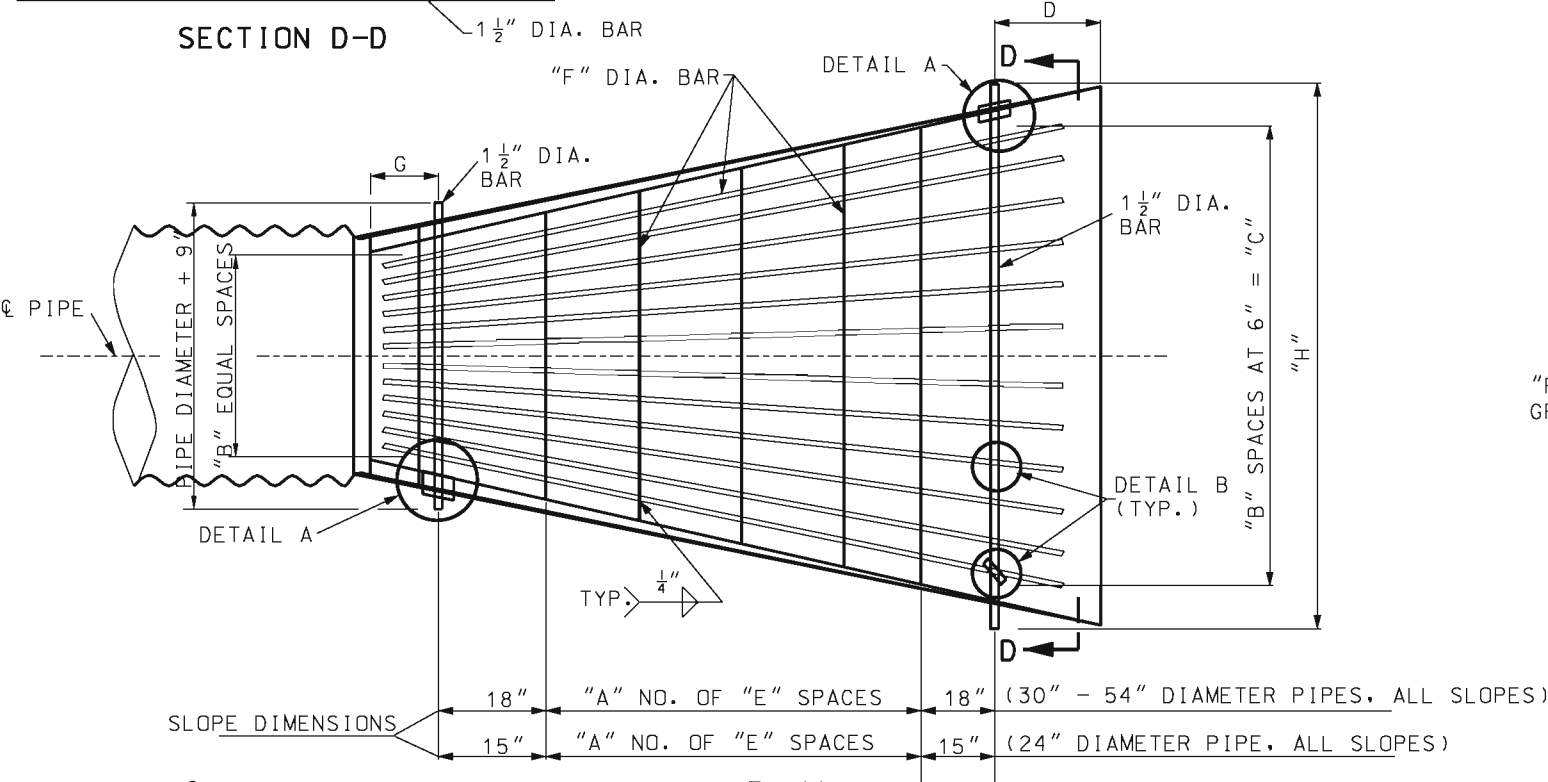
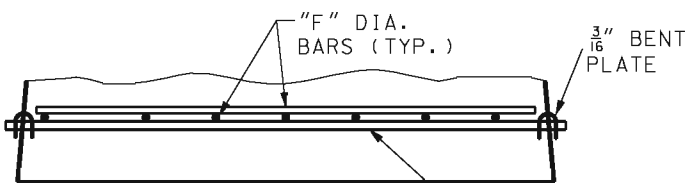
SAFETY SLOPE  
END SECTION

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

BAR GRATE SYSTEM DATA

| DRAIN<br>PIPE SIZE | 3:1 SLOPE |   |       |                    |     |                   |                    |       |       | 4:1 SLOPE |   |       |                    |     |                   |                    |       |     | 6:1 SLOPE |   |       |                    |     |                   |     |       |       |
|--------------------|-----------|---|-------|--------------------|-----|-------------------|--------------------|-------|-------|-----------|---|-------|--------------------|-----|-------------------|--------------------|-------|-----|-----------|---|-------|--------------------|-----|-------------------|-----|-------|-------|
|                    | A         | B | C     | D                  | E   | "F" BARS          | G                  | H     | J     | A         | B | C     | D                  | E   | "F" BARS          | G                  | H     | J   | A         | B | C     | D                  | E   | "F" BARS          | G   | H     | J     |
| 15"*               |           |   |       |                    |     |                   |                    |       |       |           |   |       |                    |     |                   |                    |       |     |           |   |       |                    |     |                   |     |       |       |
| 18"*               |           |   |       |                    |     |                   |                    |       |       |           |   |       |                    |     |                   |                    |       |     |           |   |       |                    |     |                   |     |       |       |
| 21"*               |           |   |       |                    |     |                   |                    |       |       |           |   |       |                    |     |                   |                    |       |     |           |   |       |                    |     |                   |     |       |       |
| 24"                | 0         | 4 | 2'-0" | 6"                 | 15" | $\frac{5}{8}$ "   | 8 $\frac{1}{4}$ "  | 3'-3" | 18.4° | 0         | 4 | 2'-0" | 15 $\frac{3}{4}$ " | 15" | $\frac{5}{8}$ "   | 12"                | 3'-3" | 14° | 2         | 4 | 2'-0" | 13 $\frac{1}{8}$ " | 15" | $\frac{5}{8}$ "   | 12" | 3'-3" | 9.5°  |
| 30"                | 0         | 5 | 2'-6" | 15 $\frac{1}{4}$ " | 18" | $\frac{5}{8}$ "   | 12"                | 3'-9" | 18.4° | 1         | 5 | 2'-6" | 16 $\frac{1}{2}$ " | 18" | $\frac{5}{8}$ "   | 12"                | 3'-9" | 14° | 3         | 5 | 2'-6" | 19 $\frac{5}{8}$ " | 18" | $\frac{5}{8}$ "   | 12" | 3'-9" | 9.5°  |
| 36"                | 1         | 6 | 3'-0" | 16 $\frac{1}{4}$ " | 18" | $\frac{3}{4}$ "   | 12"                | 4'-3" | 18.4° | 2         | 6 | 3'-0" | 18"                | 18" | $\frac{3}{4}$ "   | 17 $\frac{1}{4}$ " | 4'-3" | 14° | 5         | 6 | 3'-0" | 20 $\frac{1}{8}$ " | 18" | $\frac{3}{4}$ "   | 12" | 4'-3" | 9.5°  |
| 42"                | 2         | 7 | 3'-6" | 17 $\frac{1}{4}$ " | 18" | 1"                | 12"                | 4'-9" | 18.4° | 4         | 7 | 3'-6" | 12"                | 18" | 1"                | 12"                | 4'-9" | 14° | 7         | 7 | 3'-6" | 11 $\frac{7}{8}$ " | 18" | 1"                | 9"  | 4'-9" | 10.1° |
| 48"                | 3         | 8 | 4'-0" | 18"                | 18" | 1"                | 12 $\frac{5}{8}$ " | 5'-3" | 18.4° | 5         | 8 | 4'-0" | 18"                | 18" | 1"                | 12 $\frac{5}{8}$ " | 5'-3" | 14° | 7         | 8 | 4'-0" | 13"                | 18" | 1"                | 9"  | 5'-3" | 11.9° |
| 54"                | 4         | 9 | 4'-6" | 18"                | 18" | 1 $\frac{1}{8}$ " | 13 $\frac{3}{8}$ " | 5'-9" | 18.4° | 6         | 9 | 4'-6" | 18"                | 18" | 1 $\frac{1}{8}$ " | 19 $\frac{3}{8}$ " | 5'-9" | 14° | 7         | 9 | 4'-6" | 14 $\frac{1}{4}$ " | 18" | 1 $\frac{1}{8}$ " | 9"  | 5'-9" | 13.7° |

\* BAR GRATE SYSTEM IS NOT REQUIRED FOR DRAIN PIPE DIAMETER OF 21" OR LESS, FOR SINGLE PIPE INSTALLATIONS.



GENERAL NOTES:

ALL STEEL MATERIAL FOR BAR GRATE SYSTEM SHALL BE IN ACCORDANCE WITH ASTM A575 GRADE 1020 STEEL.

ALL MATERIAL IN GRATE SYSTEM SHALL BE GALVANIZED.

GALVANIZING SHALL BE DONE IN ACCORDANCE WITH ASTM A123.

ALL MATERIALS, FABRICATION AND INSTALLATION OF OPTIONAL BAR GRATE SYSTEM USED IN LIEU OF SAFETY BAR SYSTEM SHALL BE INCLUDED IN CONTRACT UNIT PRICE BID FOR END SECTION (SAFETY SLOPE).

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**OPTIONAL BAR GRATE SYSTEM FOR SAFETY SLOPE END SECTION**

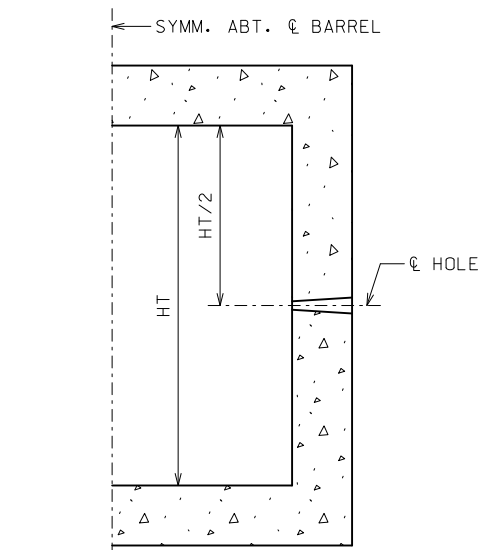
DATE EFFECTIVE: 06/01/2013  
DATE PREPARED: 4/1/2013

**732.10H**

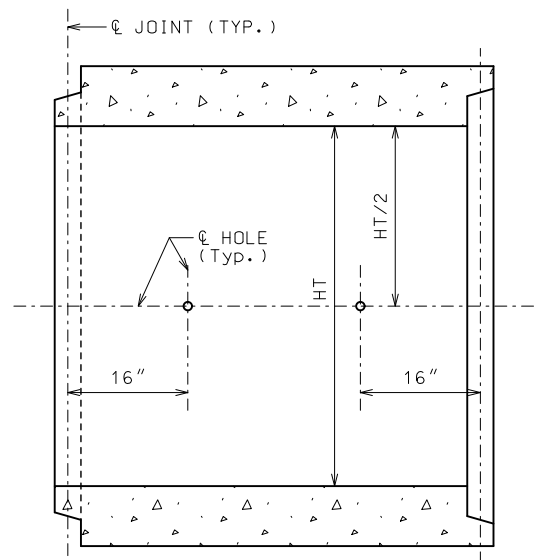
SHEET NO.  
3 OF 3

IF A SEAL IS PRESENT ON THIS SHEET, IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



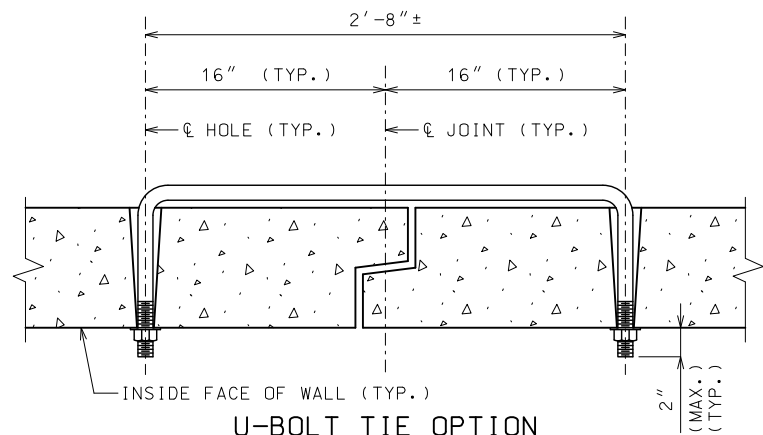


HALF SECTION THRU BARREL

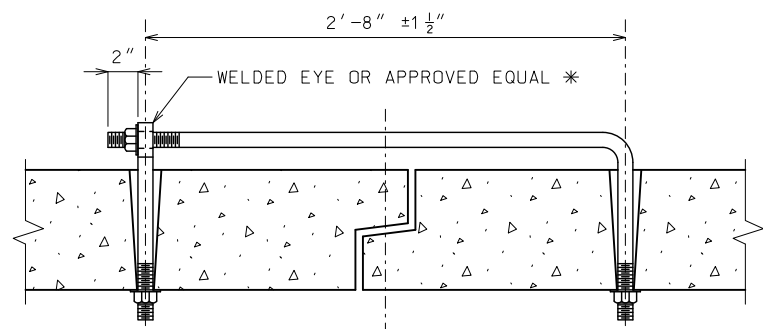


LONGITUDINAL SECTION

PLACEMENT OF HOLES

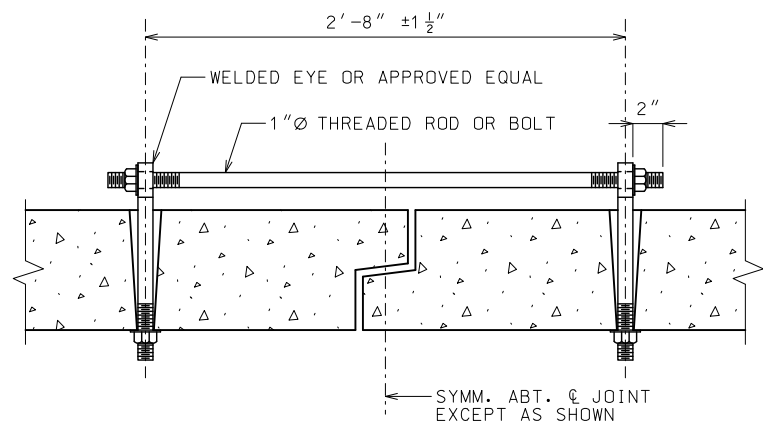


U-BOLT TIE OPTION



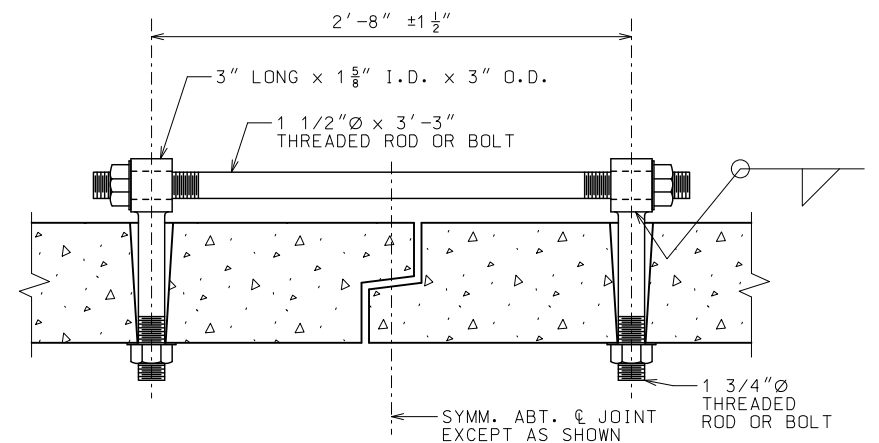
\* THE CONNECTIONS SHALL BE PLACED AT DOWNSTREAM END WHEN PLACED INSIDE OF STRUCTURE.

EYE BOLT TIE OPTION



DOUBLE CONNECTION TIE OPTION

REGULAR STRENGTH CONNECTION DETAILS



DOUBLE CONNECTION TIE

EXTRA STRENGTH CONNECTION DETAILS

#### GENERAL NOTES:

TIES SHALL BE USED ONLY TO HOLD BOX SECTIONS TOGETHER, NOT FOR PULLING SECTIONS TIGHT.

ALL PARTS OF THE TIE ASSEMBLY EXCEPT FOR ANCHORAGE SHALL BE LOCATED ON THE FILL FACE. ANCHORAGE THAT IS DIFFERENT THAN SHOWN SHALL BE APPROVED BY THE ENGINEER.

TIES SHALL ONLY BE USED FOR CONNECTING ADJACENT PRECAST SECTIONS. TIES ARE NOT TO BE USED TO CONNECT PRECAST TO CAST-IN-PLACE SECTIONS.

#### HOLES:

HOLES SHALL BE CAST OR DRILLED 16 INCHES FROM CENTERLINE OF JOINT AS SHOWN, UNLESS FORMS ARE SET UP FOR 16-INCH SPACING FROM OUTSIDE OF JOINT.

TAPERED HOLES ARE PERMITTED WHEN PRECAST.

#### REGULAR STRENGTH CONNECTIONS:

REGULAR STRENGTH CULVERT TIES SHALL BE 1" Ø THREADED RODS.

TIE RODS FOR REGULAR STRENGTH CONNECTIONS SHALL BE GALVANIZED IN ACCORDANCE WITH SEC 1081.

#### EXTRA STRENGTH CONNECTIONS:

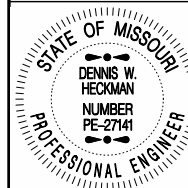
THREADED RODS FOR EXTRA STRENGTH CONNECTIONS SHALL BE STAINLESS STEEL IN ACCORDANCE WITH ASTM A193 OR A320.

NUTS FOR EXTRA STRENGTH CONNECTIONS SHALL BE STAINLESS STEEL IN ACCORDANCE WITH ASTM A194 AND OF GRADE EQUIVALENT TO GRADE USED FOR THREADED RODS.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



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PRECAST CONCRETE  
BOX CULVERT TIES

DATE EFFECTIVE: 07/01/2021  
DATE PREPARED: 5/3/2021

733.00

SHEET NO.  
1 OF 1

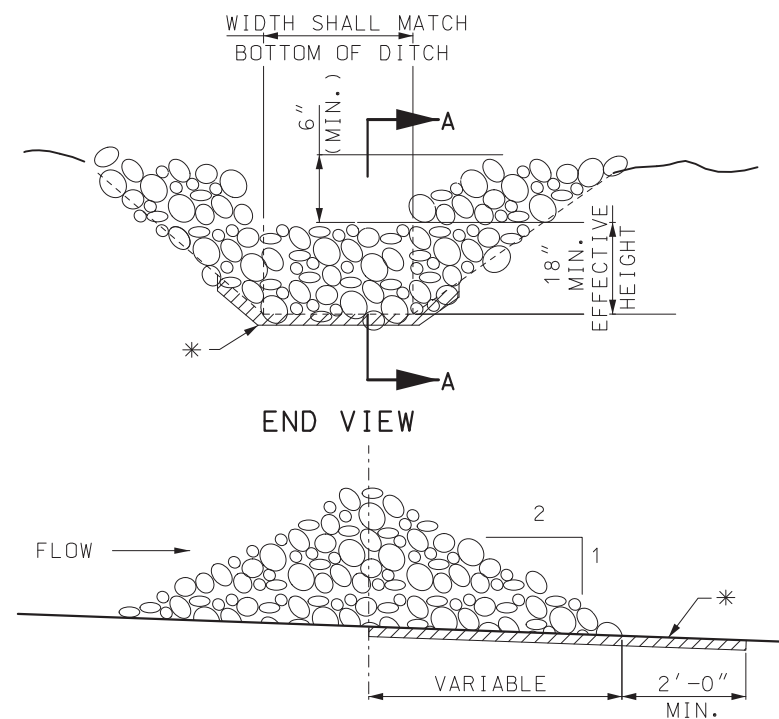
| REGION 1            |           |                            |           |                         |           |                           |           |
|---------------------|-----------|----------------------------|-----------|-------------------------|-----------|---------------------------|-----------|
| COOL SEASON GRASSES |           |                            |           | WARM SEASON GRASSES     |           |                           |           |
| LIME: 0 LBS ENM/AC  |           | FERTILIZER: 80N, 160P, 80K |           | LIME: 0 LBS ENM/AC      |           | FERTILIZER: 40N, 80P, 40K |           |
| SEED MIXTURE        |           | ADDITIONS                  |           | SEED MIXTURE            |           | ADDITIONS                 |           |
| COVER CROP          |           | COVER CROP                 |           | COVER CROP              |           | COVER CROP                |           |
| ANNUAL RYEGRASS     | 5 LBS/AC  | VIRGINIA RYE               | 5 LBS/AC  | ANNUAL RYEGRASS         | 5 LBS/AC  | VIRGINIA RYE              | 5 LBS/AC  |
| TEFF GRASS          | 4 LBS/AC  | CANADA RYE                 | 5 LBS/AC  | TEFF GRASS              | 4 LBS/AC  | CANADA RYE                | 5 LBS/AC  |
| GERMAN MILLET       | 2 LBS/AC  | WHEAT GRAIN                | 10 LBS/AC | GERMAN MILLET           | 2 LBS/AC  | WHEAT GRAIN               | 10 LBS/AC |
| OATS                | 10 LBS/AC |                            |           | OATS                    | 10 LBS/AC |                           |           |
| COOL SEASON         |           | COOL SEASON                |           | WARM SEASON             |           | WARM SEASON               |           |
| TALL FESCUE         | 70 LBS/AC | ORCHARDGRASS               | 20 LBS/AC | BUFFALO GRASS           | 15 PLS/AC | RED FESCUE                | 5 LBS/AC  |
| KENTUCKY BLUEGRASS  | 20 LBS/AC | TIMOTHY                    | 10 LBS/AC | BIG BLUESTEM            | 10 PLS/AC | PRAIRIE CORDGRASS         | 10 PLS/AC |
| PERENNIAL RYEGRASS  | 10 LBS/AC | RED FESCUE                 | 20 LBS/AC | LITTLE BLUESTEM         | 5 PLS/AC  | PRAIRIE DROPSEED          | 2 PLS/AC  |
| BUFFALO GRASS       | 15 PLS/AC | SMOOTH BROME               | 10 LBS/AC | INDIAN GRASS            | 10 PLS/AC | RIVER OATS                | 10 PLS/AC |
| RED TOP             | 4 LBS/AC  |                            |           | SIDE OATS GRAMA         | 5 PLS/AC  |                           |           |
|                     |           |                            |           | SWITCH GRASS            | 3 PLS/AC  |                           |           |
|                     |           |                            |           | RED TOP                 | 2 PLS/AC  |                           |           |
|                     |           |                            |           | PERENIAL RYEGRASS       | 10 PLS/AC |                           |           |
| LEGUME              |           | LEGUME                     |           | LEGUME                  |           | LEGUME                    |           |
| WHITE CLOVER        | 8 LBS/AC  | RED CLOVER                 | 5 LBS/AC  | WHITE CLOVER            | 5 LBS/AC  | RED CLOVER                | 5 LBS/AC  |
|                     |           | ALSIKE CLOVER              | 4 LBS/AC  |                         |           |                           |           |
| TOTAL SEED/ACRE     |           |                            |           | TOTAL SEED/ACRE         |           | TOTAL SEED/ACRE           |           |
| 148                 |           |                            |           | 92                      |           |                           |           |
|                     |           |                            |           | WILDFLOWER / POLLINATOR |           | WILDFLOWER                |           |
|                     |           |                            |           | LANCELEAF COREOPSIS     |           | GOLDEN ALEXANDERS         |           |
|                     |           |                            |           | BLACK EYED SUSAN        |           | SKY BLUE ASTER            |           |
|                     |           |                            |           | GRAY HEADED CONEFLOWER  |           | PRAIRIE BLAZING STAR      |           |
|                     |           |                            |           | PURPLE CONEFLOWER       |           |                           |           |
|                     |           |                            |           | NEW ENGLAND ASTER       |           |                           |           |
|                     |           |                            |           | COMMON MILKWEED         |           |                           |           |
|                     |           |                            |           | SWAMP MILKWEED          |           |                           |           |
|                     |           |                            |           | WHITE PRAIRIE CLOVER    |           |                           |           |
|                     |           |                            |           | PURPLE PRAIRIE CLOVER   |           |                           |           |
|                     |           |                            |           | PARTRIDGE PEA           |           |                           |           |
|                     |           |                            |           |                         |           |                           |           |

| REGION 2              |           |                           |           |                         |           |                           |           |
|-----------------------|-----------|---------------------------|-----------|-------------------------|-----------|---------------------------|-----------|
| COOL SEASON GRASSES   |           |                           |           | WARM SEASON GRASSES     |           |                           |           |
| LIME: 1000 LBS ENM/AC |           | FERTILIZER: 80N, 80P, 80K |           | LIME: 600 LBS ENM/AC    |           | FERTILIZER: 40N, 40P, 40K |           |
| SEED MIXTURE          |           | ADDITIONS                 |           | SEED MIXTURE            |           | ADDITIONS                 |           |
| COVER CROP            |           | COVER CROP                |           | COVER CROP              |           | COVER CROP                |           |
| ANNUAL RYEGRASS       | 5 LBS/AC  | VIRGINIA RYE              | 5 LBS/AC  | ANNUAL RYEGRASS         | 5 LBS/AC  | VIRGINIA RYE              | 5 LBS/AC  |
| TEFF GRASS            | 4 LBS/AC  | CANADA RYE                | 5 LBS/AC  | TEFF GRASS              | 4 LBS/AC  | CANADA RYE                | 5 LBS/AC  |
| GERMAN MILLET         | 2 LBS/AC  | WHEAT GRAIN               | 10 LBS/AC | GERMAN MILLET           | 2 LBS/AC  | WHEAT GRAIN               | 10 LBS/AC |
| OATS                  | 10 LBS/AC |                           |           | OATS                    | 10 LBS/AC |                           |           |
| COOL SEASON           |           | COOL SEASON               |           | WARM SEASON             |           | WARM SEASON               |           |
| TALL FESCUE           | 70 LBS/AC | ORCHARDGRASS              | 20 LBS/AC | BUFFALO GRASS           | 15 PLS/AC | RED FESCUE                | 5 LBS/AC  |
| KENTUCKY BLUEGRASS    | 10 LBS/AC | TIMOTHY                   | 10 LBS/AC | BIG BLUESTEM            | 10 PLS/AC | PRAIRIE CORDGRASS         | 10 PLS/AC |
| PERENNIAL RYEGRASS    | 10 LBS/AC | RED FESCUE                | 20 LBS/AC | LITTLE BLUESTEM         | 5 PLS/AC  | PRAIRIE DROPSEED          | 2 PLS/AC  |
| BUFFALO GRASS         | 15 PLS/AC | SMOOTH BROME              | 10 LBS/AC | INDIAN GRASS            | 10 PLS/AC | RIVER OATS                | 10 PLS/AC |
| RED TOP               | 4 LBS/AC  |                           |           | SIDE OATS GRAMA         | 5 PLS/AC  |                           |           |
| BERMUDA GRASS         | 10 LBS/AC |                           |           | SWITCH GRASS            | 3 PLS/AC  |                           |           |
|                       |           |                           |           | RED TOP                 | 2 PLS/AC  |                           |           |
|                       |           |                           |           | PERENIAL RYEGRASS       | 10 PLS/AC |                           |           |
| LEGUME                |           | LEGUME                    |           | LEGUME                  |           | LEGUME                    |           |
| WHITE CLOVER          | 8 LBS/AC  | RED CLOVER                | 5 LBS/AC  | WHITE CLOVER            | 5 LBS/AC  | RED CLOVER                | 5 LBS/AC  |
|                       |           | ALSIKE CLOVER             | 4 LBS/AC  |                         |           |                           |           |
| TOTAL SEED/ACRE       |           |                           |           | TOTAL SEED/ACRE         |           | TOTAL SEED/ACRE           |           |
| 148                   |           |                           |           | 92                      |           |                           |           |
|                       |           |                           |           | WILDFLOWER / POLLINATOR |           | WILDFLOWER                |           |
|                       |           |                           |           | LANCELEAF COREOPSIS     |           | GOLDEN ALEXANDERS         |           |
|                       |           |                           |           | BLACK EYED SUSAN        |           | SKY BLUE ASTER            |           |
|                       |           |                           |           | GRAY HEADED CONEFLOWER  |           | PRAIRIE BLAZING STAR      |           |
|                       |           |                           |           | PURPLE CONEFLOWER       |           |                           |           |
|                       |           |                           |           | NEW ENGLAND ASTER       |           |                           |           |
|                       |           |                           |           | COMMON MILKWEED         |           |                           |           |
|                       |           |                           |           | SWAMP MILKWEED          |           |                           |           |
|                       |           |                           |           | WHITE PRAIRIE CLOVER    |           |                           |           |
|                       |           |                           |           | PURPLE PRAIRIE CLOVER   |           |                           |           |
|                       |           |                           |           | PARTRIDGE PEA           |           |                           |           |
|                       |           |                           |           |                         |           |                           |           |

| REGION 3              |           |                            |           |                         |           |                            |           |
|-----------------------|-----------|----------------------------|-----------|-------------------------|-----------|----------------------------|-----------|
| COOL SEASON GRASSES   |           |                            |           | WARM SEASON GRASSES     |           |                            |           |
| LIME: 1500 LBS ENM/AC |           | FERTILIZER: 80N, 240P, 80K |           | LIME: 1000 LBS ENM/AC   |           | FERTILIZER: 40N, 120P, 40K |           |
| SEED MIXTURE          |           | ADDITIONS                  |           | SEED MIXTURE            |           | ADDITIONS                  |           |
| COVER CROP            |           | COVER CROP                 |           | COVER CROP              |           | COVER CROP                 |           |
| ANNUAL RYEGRASS       | 5 LBS/AC  | VIRGINIA RYE               | 5 LBS/AC  | ANNUAL RYEGRASS         | 5 LBS/AC  | VIRGINIA RYE               | 5 LBS/AC  |
| TEFF GRASS            | 4 LBS/AC  | CANADA RYE                 | 5 LBS/AC  | TEFF GRASS              | 4 LBS/AC  | CANADA RYE                 | 5 LBS/AC  |
| GERMAN MILLET         | 2 LBS/AC  | WHEAT GRAIN                | 10 LBS/AC | GERMAN MILLET           | 2 LBS/AC  | WHEAT GRAIN                | 10 LBS/AC |
| OATS                  | 10 LBS/AC |                            |           | OATS                    | 10 LBS/AC |                            |           |
| COOL SEASON           |           | COOL SEASON                |           | WARM SEASON             |           | WARM SEASON                |           |
| TALL FESCUE           | 70 LBS/AC | ORCHARDGRASS               | 20 LBS/AC | BUFFALO GRASS           | 15 PLS/AC | RED FESCUE                 | 5 LBS/AC  |
| KENTUCKY BLUEGRASS    | 10 LBS/AC | TIMOTHY                    | 10 LBS/AC | BIG BLUESTEM            | 10 PLS/AC | PRAIRIE CORDGRASS          | 10 PLS/AC |
| PERENNIAL RYEGRASS    | 10 LBS/AC | RED FESCUE                 | 20 LBS/AC | LITTLE BLUESTEM         | 5 PLS/AC  | PRAIRIE DROPSEED           | 2 PLS/AC  |
| BUFFALO GRASS         | 15 PLS/AC | SMOOTH BROME               | 10 LBS/AC | INDIAN GRASS            | 10 PLS/AC | RIVER OATS                 | 10 PLS/AC |
| RED TOP               | 4 LBS/AC  |                            |           | SIDE OATS GRAMA         | 5 PLS/AC  |                            |           |
| BERMUDA GRASS         | 10 LBS/AC |                            |           | SWITCH GRASS            | 3 PLS/AC  |                            |           |
|                       |           |                            |           | RED TOP                 | 2 PLS/AC  |                            |           |
|                       |           |                            |           | PERENIAL RYEGRASS       | 10 PLS/AC |                            |           |
| LEGUME                |           | LEGUME                     |           | LEGUME                  |           | LEGUME                     |           |
| WHITE CLOVER          | 8 LBS/AC  | RED CLOVER                 | 5 LBS/AC  | WHITE CLOVER            | 5 LBS/AC  | RED CLOVER                 | 5 LBS/AC  |
|                       |           | ALSIKE CLOVER              | 4 LBS/AC  |                         |           |                            |           |
| TOTAL SEED/ACRE       |           |                            |           | TOTAL SEED/ACRE         |           | TOTAL SEED/ACRE            |           |
| 148                   |           |                            |           | 92                      |           |                            |           |
|                       |           |                            |           | WILDFLOWER / POLLINATOR |           | WILDFLOWER                 |           |
|                       |           |                            |           | LANCELEAF COREOPSIS     |           | GOLDEN ALEXANDERS          |           |
|                       |           |                            |           | BLACK EYED SUSAN        |           | SKY BLUE ASTER             |           |
|                       |           |                            |           | GRAY HEADED CONEFLOWER  |           | PRAIRIE BLAZING STAR       |           |
|                       |           |                            |           | PURPLE CONEFLOWER       |           |                            |           |
|                       |           |                            |           | NEW ENGLAND ASTER       |           |                            |           |
|                       |           |                            |           | COMMON MILKWEED         |           |                            |           |
|                       |           |                            |           | SWAMP MILKWEED          |           |                            |           |
|                       |           |                            |           | WHITE PRAIRIE CLOVER    |           |                            |           |
|                       |           |                            |           | PURPLE PRAIRIE CLOVER   |           |                            |           |
|                       |           |                            |           | PARTRIDGE PEA           |           |                            |           |
|                       |           |                            |           |                         |           |                            |           |

| REGION 4            |           |                            |           |                                   |           |                                  |           |
|---------------------|-----------|----------------------------|-----------|-----------------------------------|-----------|----------------------------------|-----------|
| COOL SEASON GRASSES |           |                            |           | WARM SEASON GRASSES               |           |                                  |           |
| LIME: 0 LBS ENM/AC  |           | FERTILIZER: 80N, 160P, 80K |           | LIME: 0 LBS ENM/AC                |           | FERTILIZER: 40N, 80P, 40K        |           |
| SEED MIXTURE        |           | ADDITIONS                  |           | SEED MIXTURE                      |           | ADDITIONS                        |           |
| COVER CROP          |           | COVER CROP                 |           | COVER CROP                        |           | COVER CROP                       |           |
| ANNUAL RYEGRASS     | 5 LBS/AC  | VIRGINIA RYE               | 5 LBS/AC  | ANNUAL RYEGRASS                   | 5 LBS/AC  | VIRGINIA RYE                     | 5 LBS/AC  |
| TEFF GRASS          | 4 LBS/AC  | CANADA RYE                 | 5 LBS/AC  | TEFF GRASS                        | 4 LBS/AC  | CANADA RYE                       | 5 LBS/AC  |
| GERMAN MILLET       | 2 LBS/AC  | WHEAT GRAIN                | 10 LBS/AC | GERMAN MILLET                     | 2 LBS/AC  | WHEAT GRAIN                      | 10 LBS/AC |
| OATS                | 10 LBS/AC |                            |           | OATS                              | 10 LBS/AC |                                  |           |
| COOL SEASON         |           | COOL SEASON                |           | WARM SEASON                       |           | WARM SEASON                      |           |
| TALL FESCUE         | 70 LBS/AC | ORCHARDGRASS               | 20 LBS/AC | BUFFALO GRASS                     | 15 PLS/AC | RED FESCUE                       | 5 LBS/AC  |
| KENTUCKY BLUEGRASS  | 10 LBS/AC | TIMOTHY                    | 10 LBS/AC | BIG BLUESTEM                      | 10 PLS/AC | PRAIRIE CORDGRASS                | 10 PLS/AC |
| PERENNIAL RYEGRASS  | 10 LBS/AC | RED FESCUE                 | 20 LBS/AC | LITTLE BLUESTEM                   | 5 PLS/AC  | PRAIRIE DROPSEED                 | 2 PLS/AC  |
| BUFFALO GRASS       | 15 PLS/AC | SMOOTH BROME               | 10 LBS/AC | INDIAN GRASS                      | 10 PLS/AC | RIVER OATS                       | 10 PLS/AC |
| RED TOP             | 4 LBS/AC  |                            |           | SIDE OATS GRAMA                   | 5 PLS/AC  |                                  |           |
| BERMUDA GRASS       | 10 LBS/AC |                            |           | SWITCH GRASS                      | 3 PLS/AC  |                                  |           |
|                     |           |                            |           | RED TOP                           | 2 PLS/AC  |                                  |           |
|                     |           |                            |           | PERENIAL RYEGRASS                 | 10 PLS/AC |                                  |           |
| LEGUME              |           | LEGUME                     |           | LEGUME                            |           | LEGUME                           |           |
| WHITE CLOVER        | 8 LBS/AC  | RED CLOVER                 | 5 LBS/AC  | WHITE CLOVER                      | 5 LBS/AC  | RED CLOVER                       | 5 LBS/AC  |
|                     |           | ALSIKE CLOVER              | 4 LBS/AC  |                                   |           |                                  |           |
| TOTAL SEED/ACRE 148 |           |                            |           | TOTAL SEED/ACRE 92                |           |                                  |           |
|                     |           |                            |           | WILDFLOWER / POLLINATOR           |           | WILDFLOWER                       |           |
|                     |           |                            |           | LANCELEAF COREOPSIS 0.5 LBS/AC    |           | GOLDEN ALEXANDERS 0.25 LBS/AC    |           |
|                     |           |                            |           | BLACK EYED SUSAN 0.5 LBS/AC       |           | SKY BLUE ASTER 0.25 LBS/AC       |           |
|                     |           |                            |           | GRAY HEADED CONEFLOWER 1 LBS/AC   |           | PRAIRIE BLAZING STAR 0.25 LBS/AC |           |
|                     |           |                            |           | PURPLE CONEFLOWER 2 LBS/AC        |           |                                  |           |
|                     |           |                            |           | NEW ENGLAND ASTER 0.25 LBS/AC     |           |                                  |           |
|                     |           |                            |           | COMMON MILKWEED 0.5 LBS/AC        |           |                                  |           |
|                     |           |                            |           | SWAMP MILKWEED 0.25 LBS/AC        |           |                                  |           |
|                     |           |                            |           | WHITE PRAIRIE CLOVER 0.25 LBS/AC  |           |                                  |           |
|                     |           |                            |           | PURPLE PRAIRIE CLOVER 0.25 LBS/AC |           |                                  |           |
|                     |           |                            |           | PARTRIDGE PEA 0.5 LBS/AC          |           |                                  |           |
|                     |           |                            |           | TOTAL SEED/ACRE 92                |           |                                  |           |

ROCK DITCH CHECK



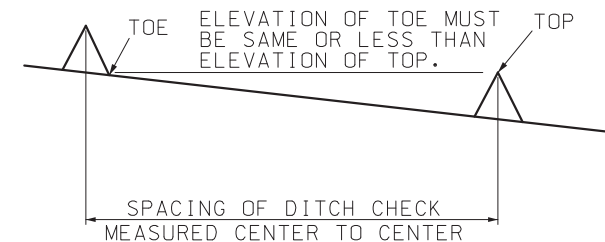
SECTION A-A

\* GEOTEXTILE LINING MAY BE INSTALLED AS REQUIRED BY THE ENGINEER.

NOTE:  
ROCK DITCH CHECK IN THE CLEAR ZONE SHALL BE REMOVED OR LEVELED (IF ALLOWABLE) AFTER THE VEGETATION HAS SUFFICIENTLY MATURED TO PROTECT THE DITCH OR SWALE.

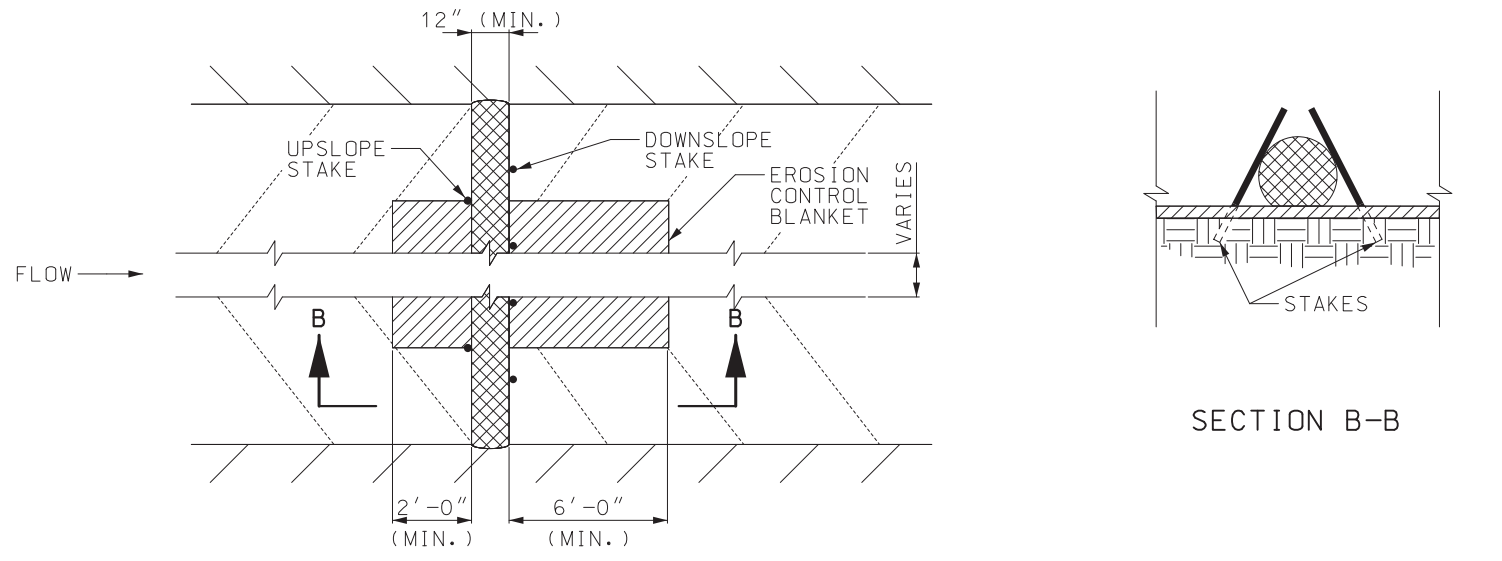
EXAMPLE  
DITCH CHECK SPACING  
FOR STANDARD HEIGHTS  
(FT.)

| DITCH & SLOPE % | SPACING FOR 9" EFF. HEIGHT | SPACING FOR 18" EFF. HEIGHT |
|-----------------|----------------------------|-----------------------------|
| 0.5             | 150                        | 300                         |
| 1.0             | 75                         | 150                         |
| 1.5             | 50                         | 100                         |
| 2.0             | 37                         | 75                          |
| 2.5             | 30                         | 60                          |
| 3.0             | 25                         | 50                          |
| 3.5             | 21                         | 43                          |
| 4.0             | 19                         | 38                          |
| 4.5             | 16                         | 33                          |
| 5.0             | 15                         | 30                          |
| 5.5             | 13                         | 27                          |
| 6.0             | 12                         | 25                          |
| 6.5             | 11                         | 23                          |
| 7.0             | 10                         | 21                          |
| 7.5             | 10                         | 20                          |
| 8.0             | 9                          | 19                          |
| 8.5             | 9                          | 18                          |
| 9.0             | 8                          | 17                          |
| 9.5             | 8                          | 16                          |
| 10.0            | 7                          | 15                          |



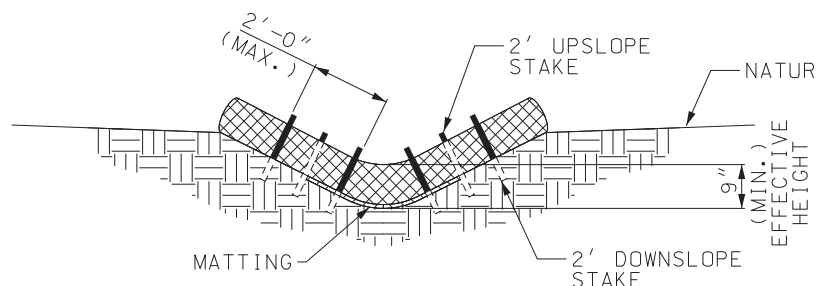
MINIMUM DITCH CHECK SPACING

ALTERNATE DITCH CHECK

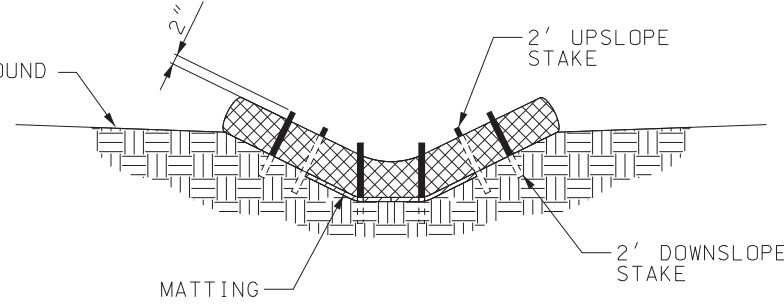


PLAN VIEW

SECTION B-B



TYPICAL SECTION  
VEE DITCH



TYPICAL SECTION  
TRAPEZOIDAL DITCH

NOTES:  
USE MINIMUM 12 IN. DIAMETER LOG/SOCK.  
USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.  
INSTALL LOG/SOCK TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND LOG/SOCK AND SCOUR DITCH SLOPES OR AS DIRECTED BY ENGINEER.  
INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE LOG/SOCK TO BOTTOM OF DITCH.  
EROSION CONTROL BLANKET SHALL BE ANCHORED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

GENERAL NOTES:  
OTHER PROPRIETARY DITCH CHECKS MAY BE SUBSTITUTED IN ACCORDANCE WITH SEC 806 OR AS DIRECTED BY THE ENGINEER.  
INSTALLATION OF PROPRIETARY DITCH CHECKS SHALL BE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
TRAVIS D. KOESTNER  
NUMBER PE-30042  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

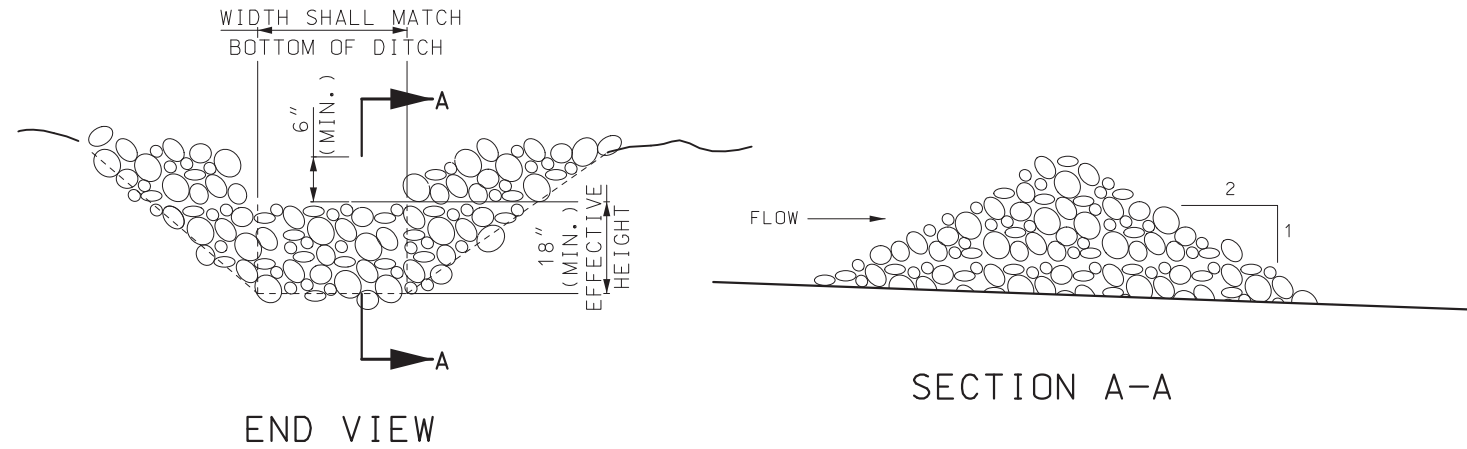
TEMPORARY EROSION CONTROL MEASURES  
TEMPORARY DITCH CHECKS

DATE EFFECTIVE: 01/01/2023  
DATE PREPARED: 10/11/2022

806.10K

SHEET NO.  
1 OF 6

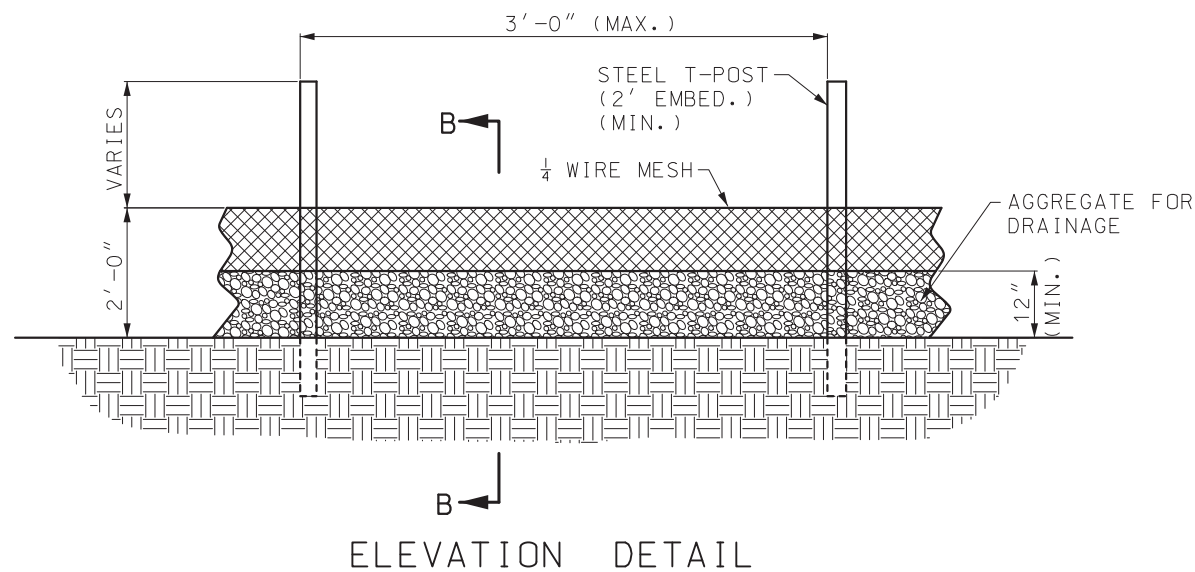
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



NOTE:

**SEDIMENT TRAP**

SEDIMENT TRAP IN THE CLEAR ZONE SHALL BE REMOVED OR LEVELED (IF ALLOWABLE) AFTER THE VEGETATION HAS SUFFICIENTLY MATURED TO PROTECT THE DITCH OR SWALE.



NOTES:

ROCK/MESH SEDIMENT CONTROL FENCE MAY BE NECESSARY, AS DETERMINED BY THE ENGINEER, IN ISOLATED AREAS WHERE PERIMETER SILT FENCE IS DEEMED INSUFFICIENT TO WITHSTAND SHEET FLOW. WHEN REQUIRED, IT WILL BE PAID PER LINEAR FOOT AS ROCK DITCH CHECK.

AGGREGATE FOR DRAINAGE SHALL BE IN ACCORDANCE WITH SEC 1009, GRADE 4 OR GRADE 5.

USE HARDWARE CLOTH 24 GAUGE WIRE MESH WITH 1/4 INCH MESH OPENINGS.

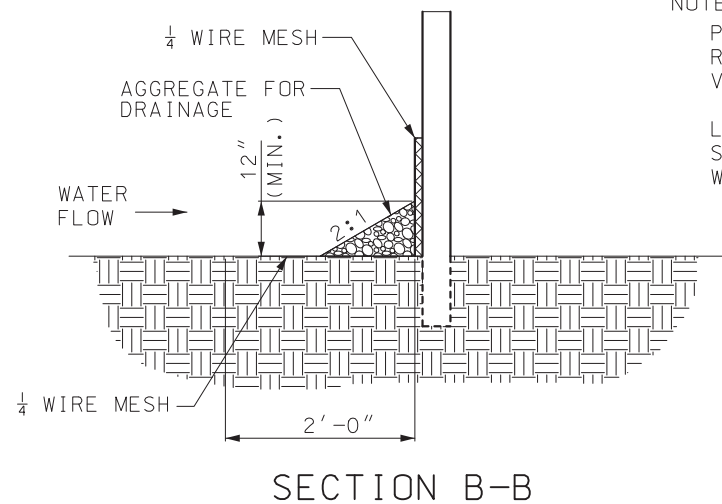
INSTALL 5 FT. T-POST WITH A 2 FOOT EMBEDMENT DEPTH (MIN.).

ATTACH HARDWARE CLOTH TO POST WITH WIRE STAPLE OR OTHER ACCEPTABLE METHODS.

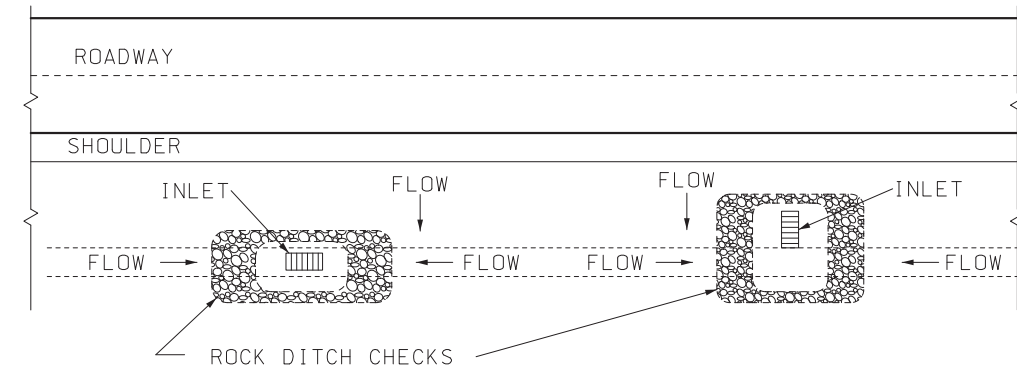
SPACE POST A MAXIMUM OF 3 FT.

FOR INSTALLATION BETWEEN SECTIONS OF SILT FENCE, EXTEND AGGREGATE FOR DRAINAGE A MINIMUM OF 12 INCHES ON EACH SIDE OF SPECIAL SEDIMENT CONTROL FENCE SECTION.

ROCK/MESH SEDIMENT CONTROL FENCE MAY BE USED IN LIEU OF ROCK DITCH CHECK TO SURROUND AN INLET, AT NO ADDITIONAL COST TO THE COMMISSION.

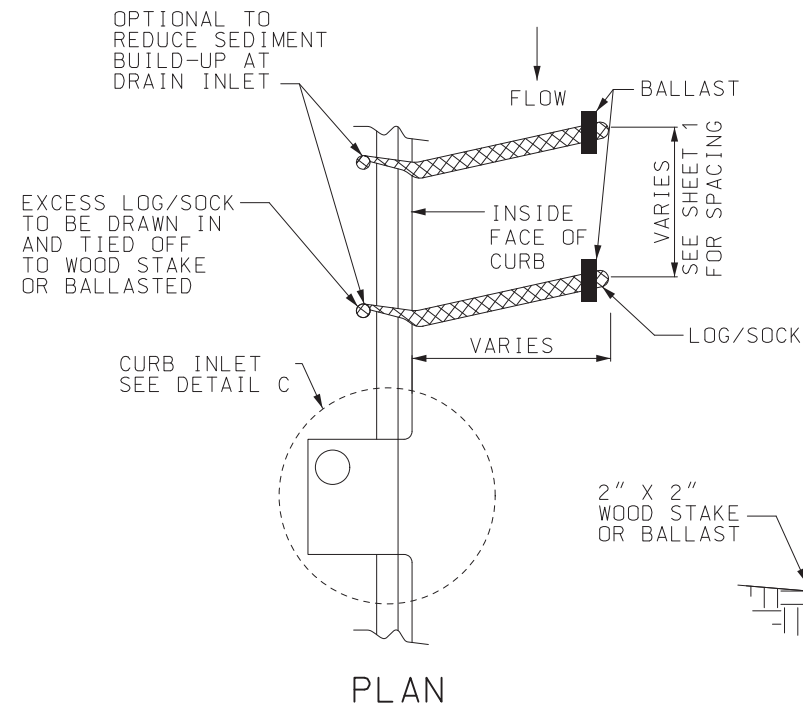


## ROCK/MESH SEDIMENT CONTROL FENCE



## DROP INLET CHECK

SEE SHEET 1 OF 6 FOR DETAILS OF ROCK DITCH CHECK.



## CURB INLET PROTECTION

NOTES:

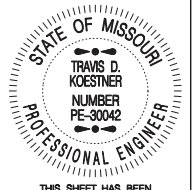
PRIOR TO PLACEMENT ALL DEBRIS, ROCK, LARGE CLODS AND WOOD VEGETATION SHALL BE CLEARED.

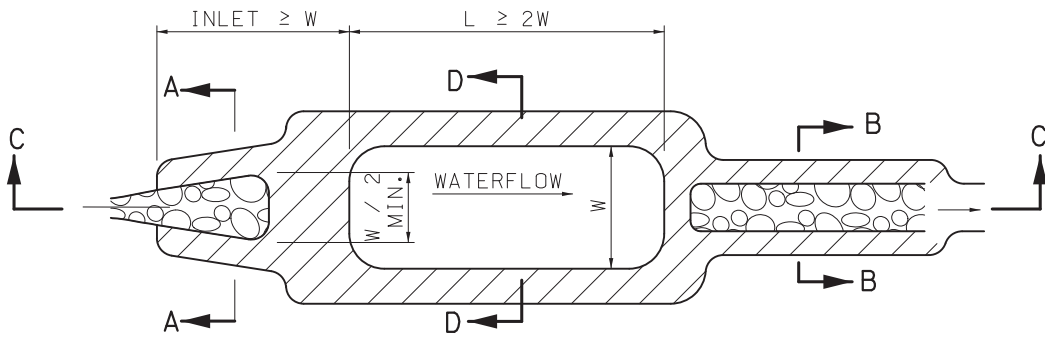
LOG/SOCK PLACED ON PAVEMENT SHALL BE WEIGHTED DOWN WITH GRAVEL/SAND BALLAST.

GENERAL NOTES:

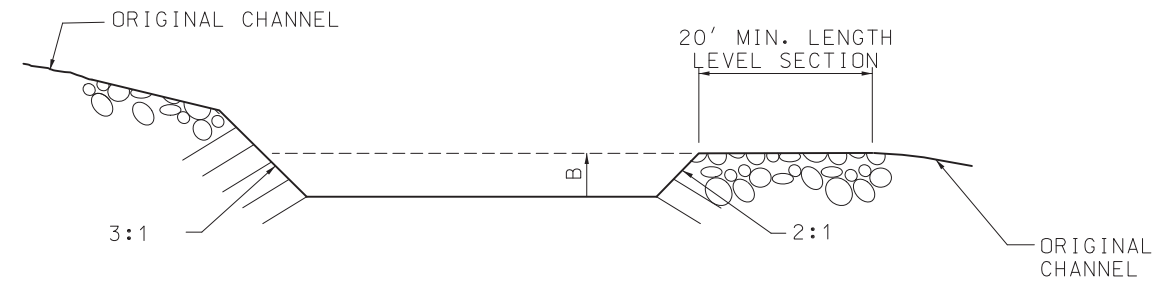
OTHER PROPRIETARY INLET PROTECTION MAY BE SUBSTITUTED IN ACCORDANCE WITH SEC 806 OR AS DIRECTED BY THE ENGINEER.

FOR SEDIMENT CONTROL SPACING SEE SHEET 1 OF 6.

|                                                                                                                                                                                                                                  |                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                  |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <p><b>TEMPORARY EROSION CONTROL MEASURES</b></p> |
| DATE EFFECTIVE: 01/01/2023<br>DATE PREPARED: 10/11/2022                                                                                                                                                                          | <p><b>806.10K</b></p>                            |
| SHEET NO. 2 OF 6                                                                                                                                                                                                                 |                                                  |

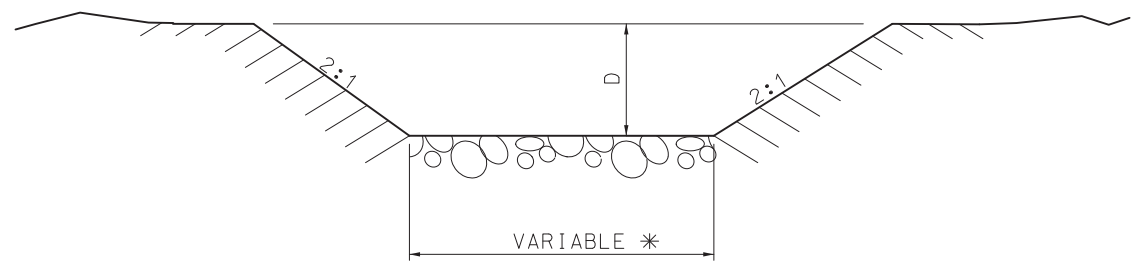


PLAN VIEW



SECTION C-C

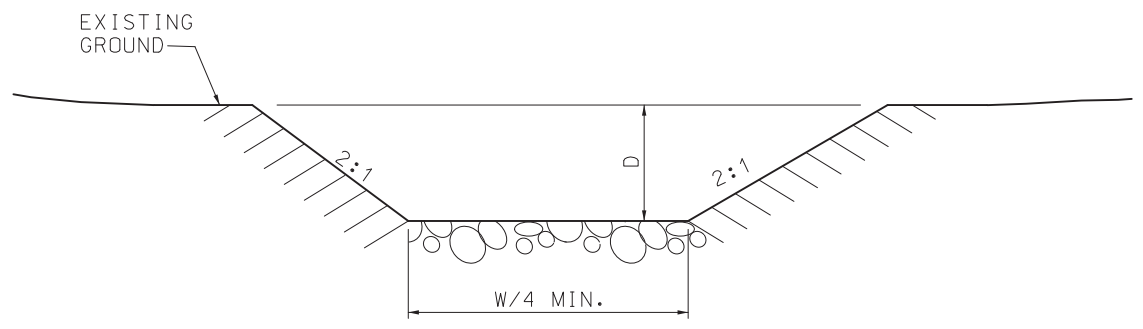
EFFECTIVE DEPTH "B" = MIN. 2'. MAX. 6' DEPENDENT UPON CONFIGURATION REQUIRED BY LOCATION AND ESTIMATED VOLUME.



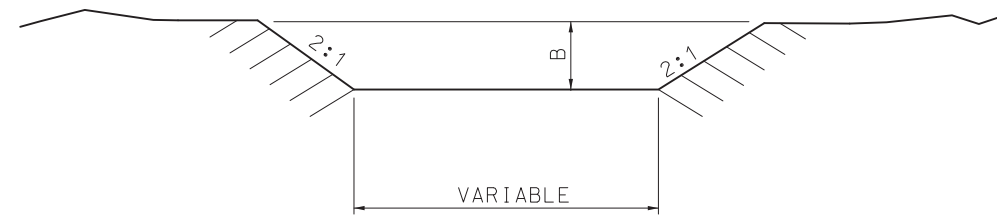
SECTION A-A  
INLET

$D = 1.0' + \text{DESIGN FLOW DEPTH-MIN.}$

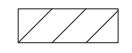
\* VARIES FROM WIDTH OF STREAM AT INLET TO ONE-HALF WIDTH OF POND AT OUTLET.



SECTION B-B  
OUTLET



SECTION D-D



LAYER OF APPROVED STABILIZING MATERIAL FOR SCOUR PREVENTION

GENERAL NOTES:

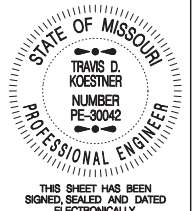
SEDIMENT BASINS ARE TO BE INCLUDED IN THE BMP SYSTEM WHEN THE GEOMETRY OF RIGHT-OF-WAY ALLOWS. WHERE INCLUDED, SEDIMENT BASINS ARE TO BE DESIGNED AND CONSTRUCTED TO PROVIDE STORAGE VOLUME FOR THE LOCAL 2-YR, 24-HOUR STORM FOR DISTURBED ACREAGE DRAINING TO THEM. IF THE DESIGN STORM VOLUME HAS NOT BEEN CALCULATED, BASINS ARE TO BE DESIGNED AND CONSTRUCTED TO PROVIDE A STORAGE VOLUME OF AT LEAST 3,600 CUBIC FEET PER DISTURBED ACRE DRAINING TO THE BASIN(S).

IF SEDIMENT BASIN IS TO BE PERMANENT ITS SLOPES SHALL BE STABILIZED WITH ROCK RIPRAP OR EQUIVALENT.

THE MATERIALS FOR ROCK RIPRAP SHALL MEET THE REQUIREMENTS OF SEC 611.30 FOR TYPE 2 ROCK BLANKET.

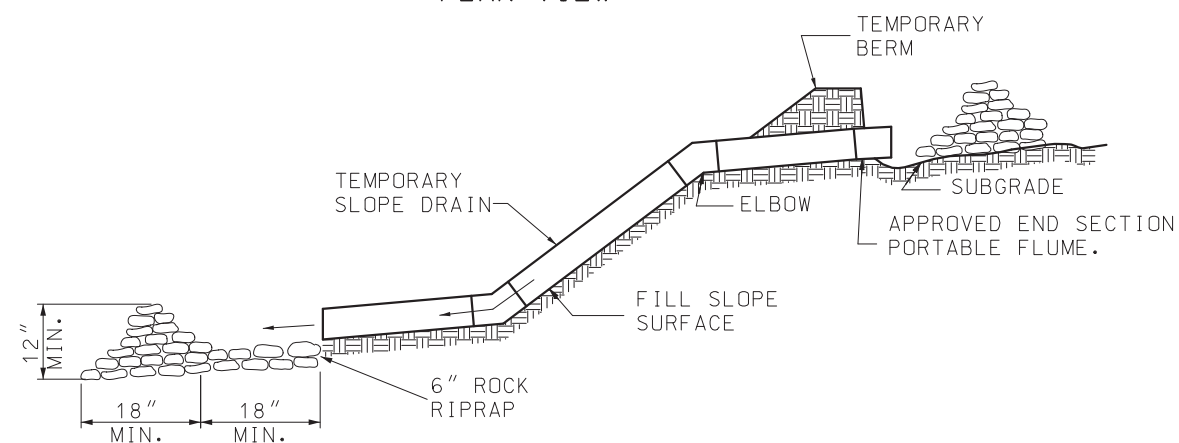
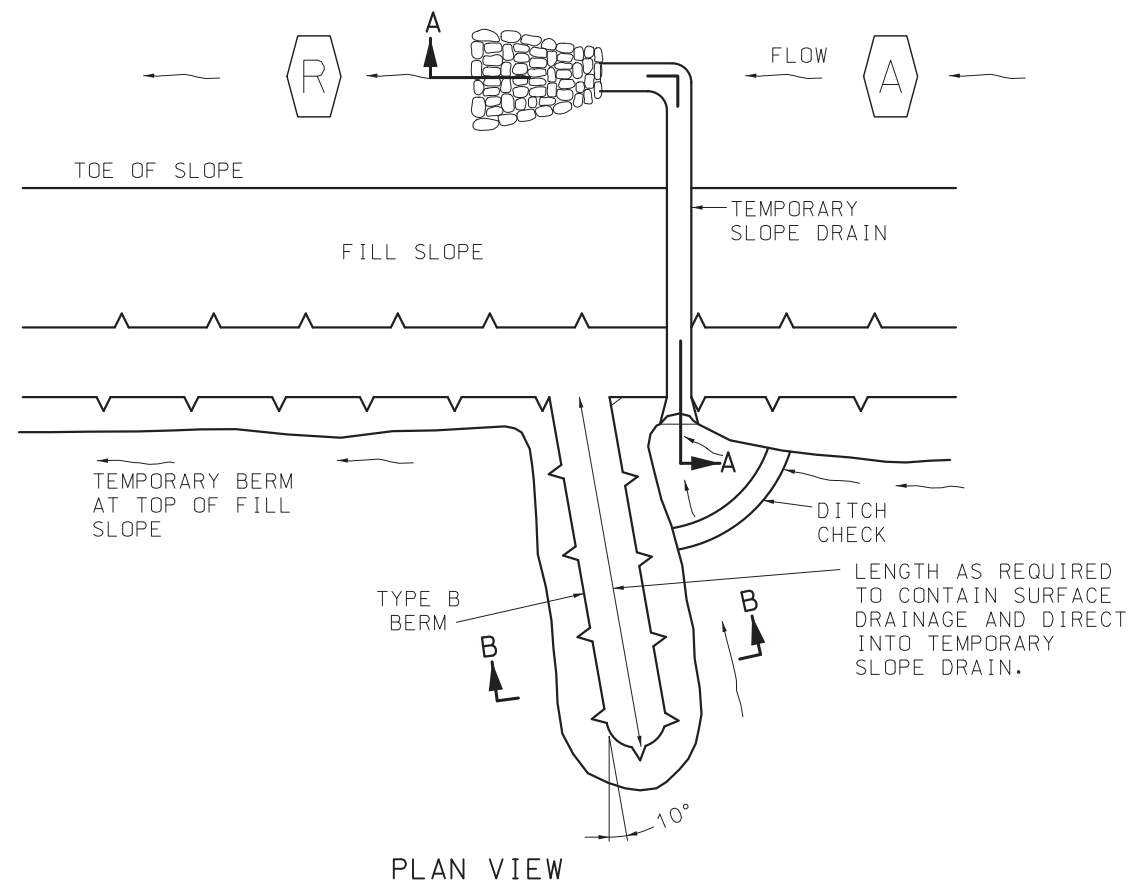
SEE PLANS FOR LENGTH, DEPTH AND WIDTH OF BASIN.

SEE PLANS FOR ESTIMATED QUANTITIES OF ROCK RIPRAP - CUBIC YARDS.

|                                                                                                                                                                                                                                  |                                                                    |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                    |                |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>TEMPORARY EROSION CONTROL MEASURES</b><br><b>SEDIMENT BASIN</b> |                |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 01/01/2023<br>DATE PREPARED: 10/11/2022            | <b>806.10K</b> |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

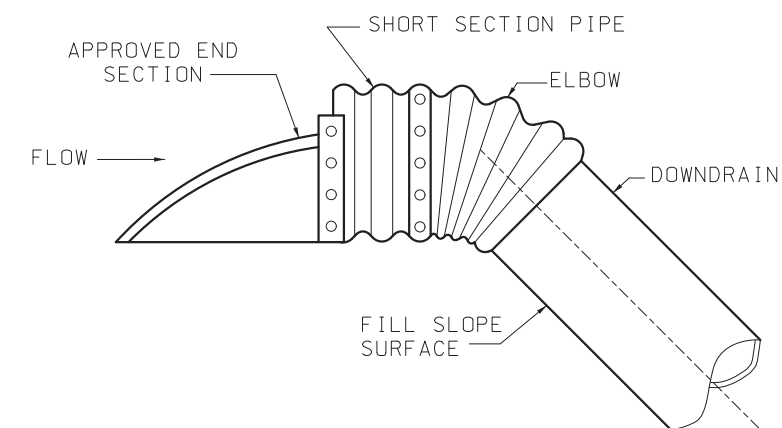
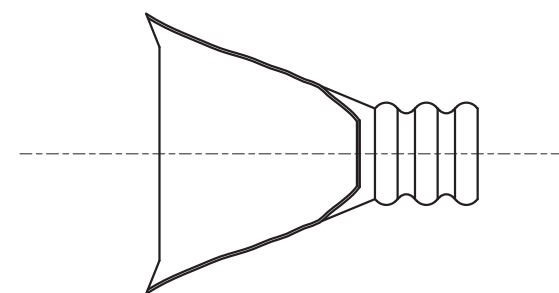




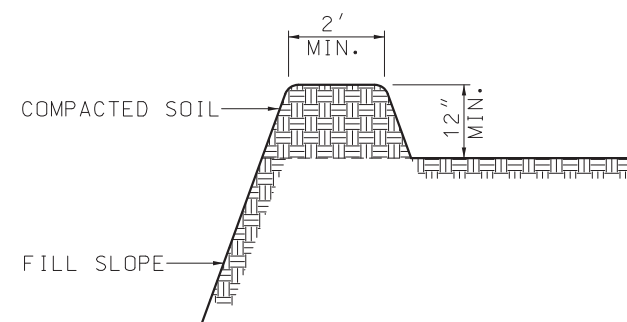
## TEMPORARY BERM

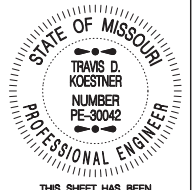
(METAL, FLEXIBLE RUBBER OR PLASTIC PIPE)

NOTE:  
MAXIMUM LENGTH BETWEEN SLOPE DRAINS SHALL BE APPROXIMATELY 500 FEET.

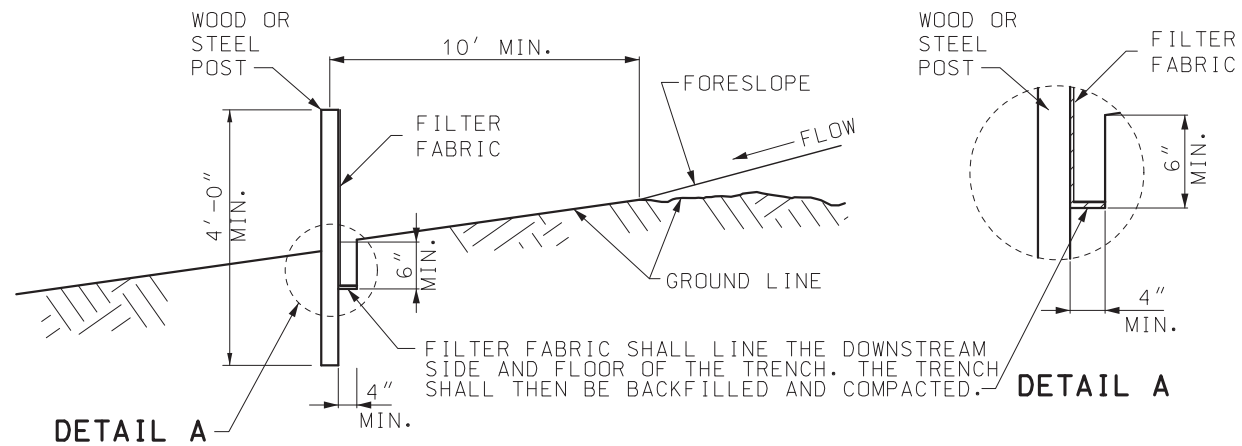


## TEMPORARY SLOPE DRAIN INLET TREATMENT

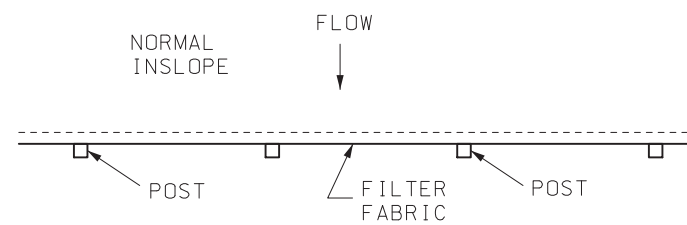


|                                                                                                                                                                                                                                                                 |                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                |                                                               |
|  <p>STATE OF MISSOURI<br/>TRAVIS D. KOESTNER<br/>NUMBER PE-30042<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <b>TEMPORARY EROSION<br/>CONTROL MEASURES</b><br>SLOPE DRAINS |
| DATE EFFECTIVE: 01/01/2023<br>DATE PREPARED: 10/11/2022                                                                                                                                                                                                         | <b>806.10K</b>                                                |
| SHEET NO.<br>4 OF 6                                                                                                                                                                                                                                             |                                                               |

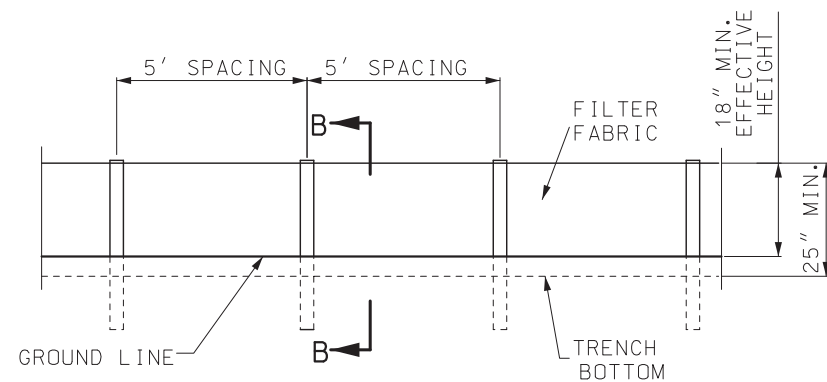




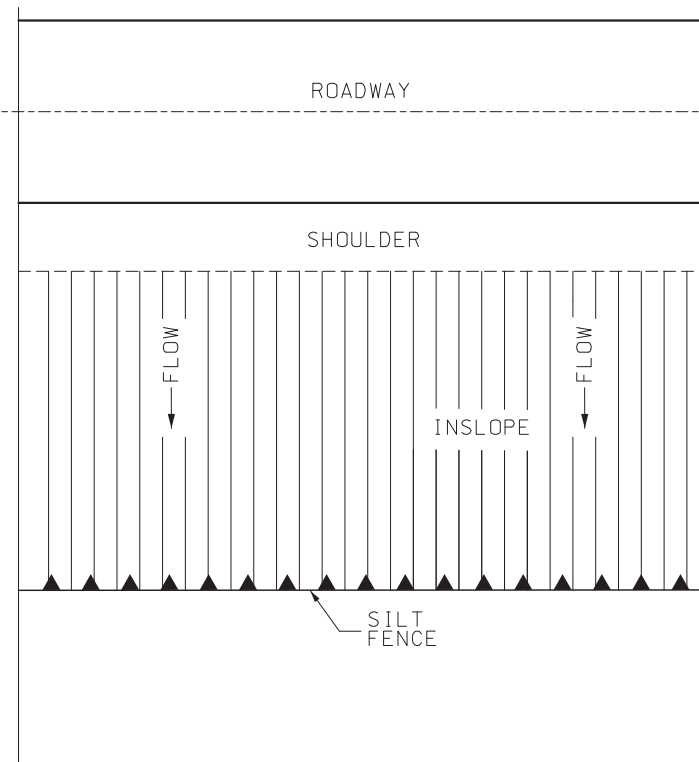
TYPICAL B-B



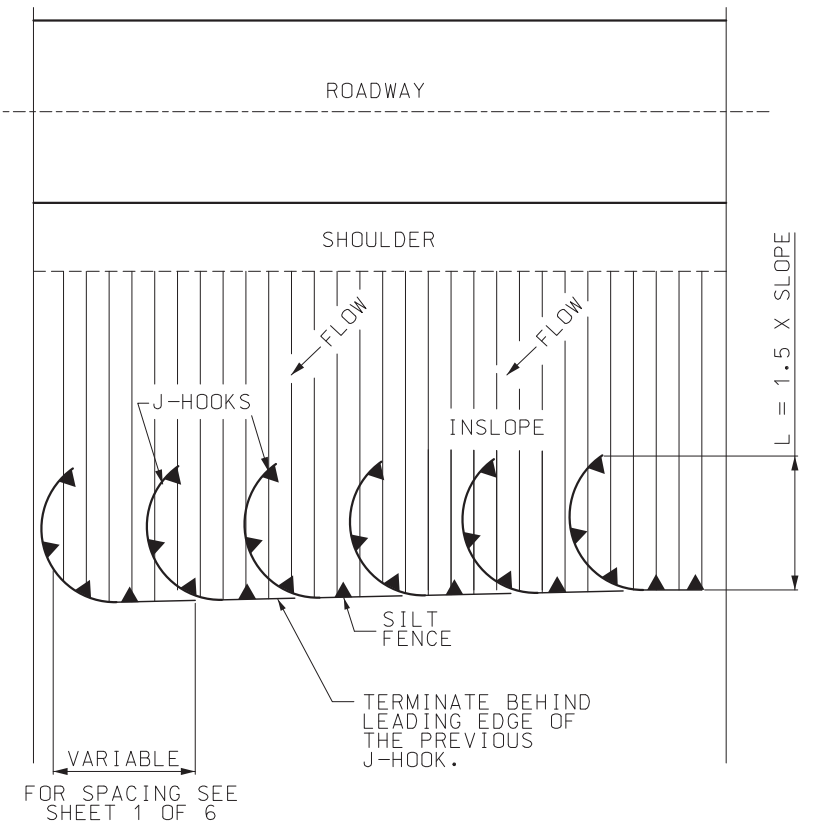
PLAN VIEW



ELEVATION DETAIL  
FABRIC SILT FENCE



PERIMETER SILT FENCE  
FOR TRANSVERSE FLOW



PERIMETER SILT FENCE  
FOR ANGULAR FLOW

GENERAL NOTES:

USE SILT FENCE FOR FILL HEIGHTS GREATER OR EQUAL TO 10 FEET. ON ALL FILLS GREATER THAN 10 FEET HIGH, MID-SLOPE RUNS OF SILT FENCE SHOULD BE CONSIDERED.

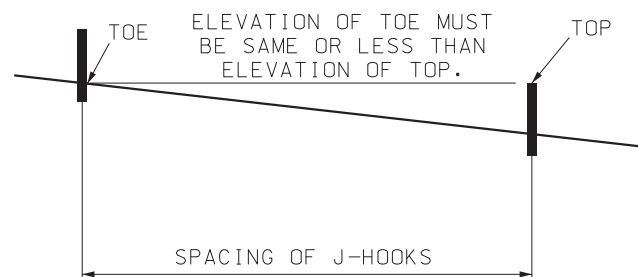
FOR FABRIC SILT FENCE:

MINIMUM LONGITUDINAL SPLICE OVERLAP SHALL BE 2' WITH A POST AT EACH END.

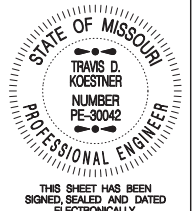
SECURE FABRIC TO POSTS.

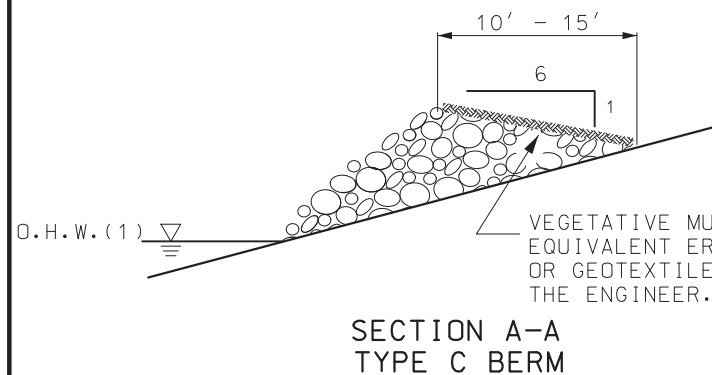
INSTEAD OF SILT FENCE ACROSS DRAINAGE DITCHES AND DRAINS, DITCH CHECKS SHALL BE USED AS SHOWN ON PLANS OR AS DIRECTED BY ENGINEER.

AT CULVERTS, PLACE SEDIMENT BARRIERS OVER THE TOP OF THE CULVERTS (NOT IN THE STREAM CHANNEL).

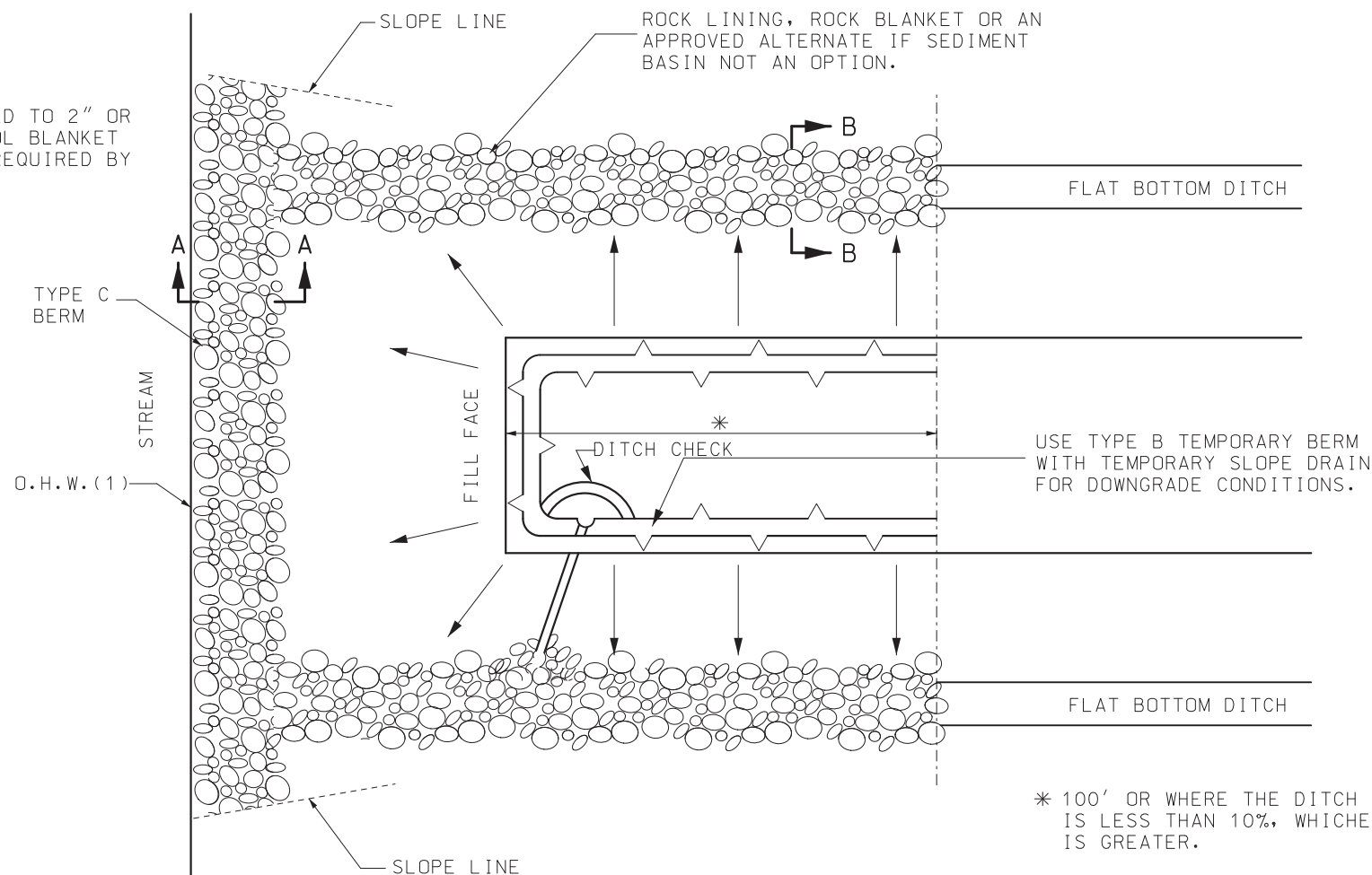


MINIMUM J-HOOK SPACING

|                                                                                                                                                                                                                                  |                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                             |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p>                                                                | <b>TEMPORARY EROSION<br/>CONTROL MEASURES</b><br>SILT FENCE |
| DATE EFFECTIVE: 01/01/2023<br>DATE PREPARED: 10/11/2022                                                                                                                                                                          | 806.10K<br>SHEET NO.<br>5 OF 6                              |



(1) TYPE C BERM SHALL BE PLACED ABOVE THE ORDINARY HIGH WATER (O.H.W.) OR AT AN ELEVATION AS DIRECTED BY THE ENGINEER.



\* 100' OR WHERE THE DITCH SLOPE IS LESS THAN 10%, WHICHEVER IS GREATER.

**PLAN VIEW**

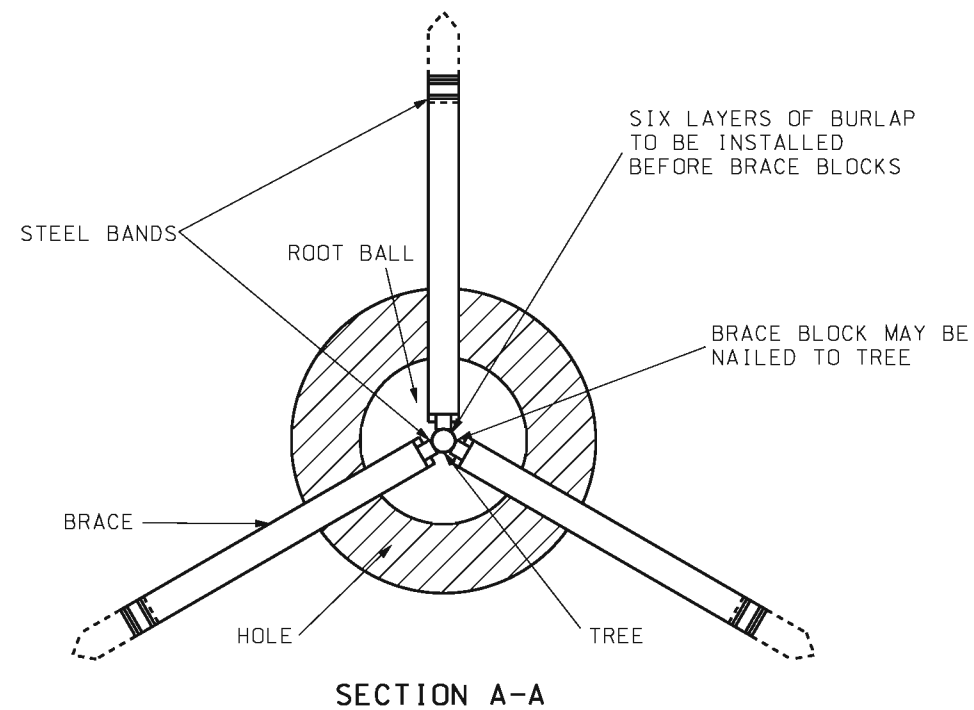


**SECTION B-B**

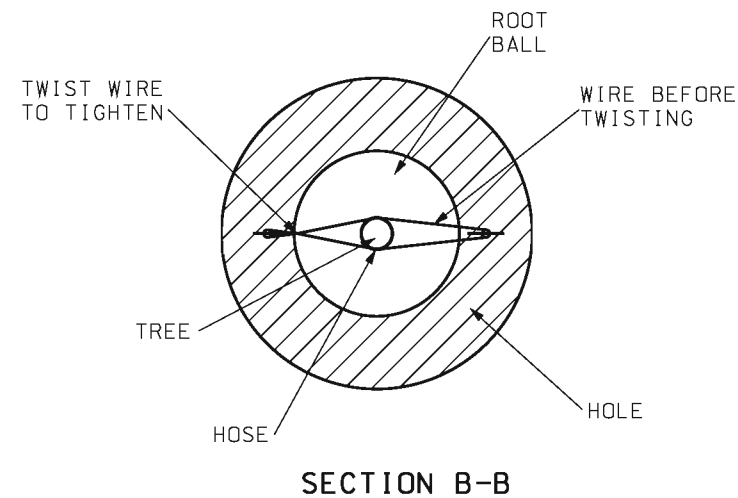
**GENERAL NOTES:**

TYPE C BERM SHALL BE BUILT TO HANDLE SIGNIFICANT RUN-OFF EVENTS AND SHALL BE INSTALLED PRIOR TO SOIL DISTURBANCE OR PLACEMENT OF FILL IN THE DRAINAGE AREA OF THE BERM.

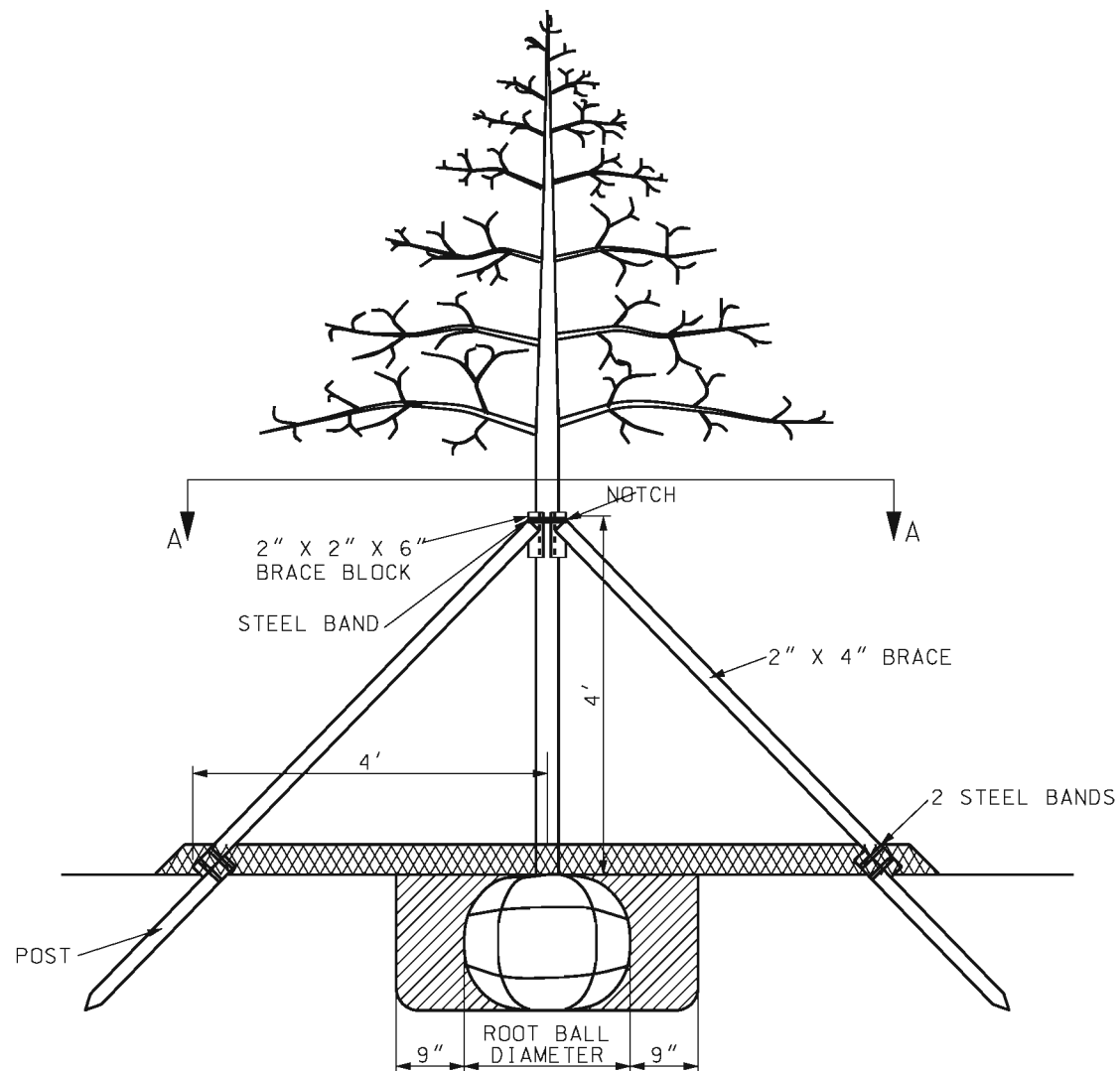
|                                                                                                                                                                                                                                               |                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                                                      |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                                     | <p><b>TEMPORARY EROSION CONTROL MEASURES</b></p> <p>BRIDGES AND BOX CULVERTS AT STREAM CROSSINGS</p> |
| <p>DATE EFFECTIVE: 01/01/2023</p> <p>DATE PREPARED: 10/11/2022</p>                                                                                                                                                                            | <p><b>806.10K</b></p>                                                                                |
| <p>SHEET NO. 6 OF 6</p>                                                                                                                                                                                                                       |                                                                                                      |



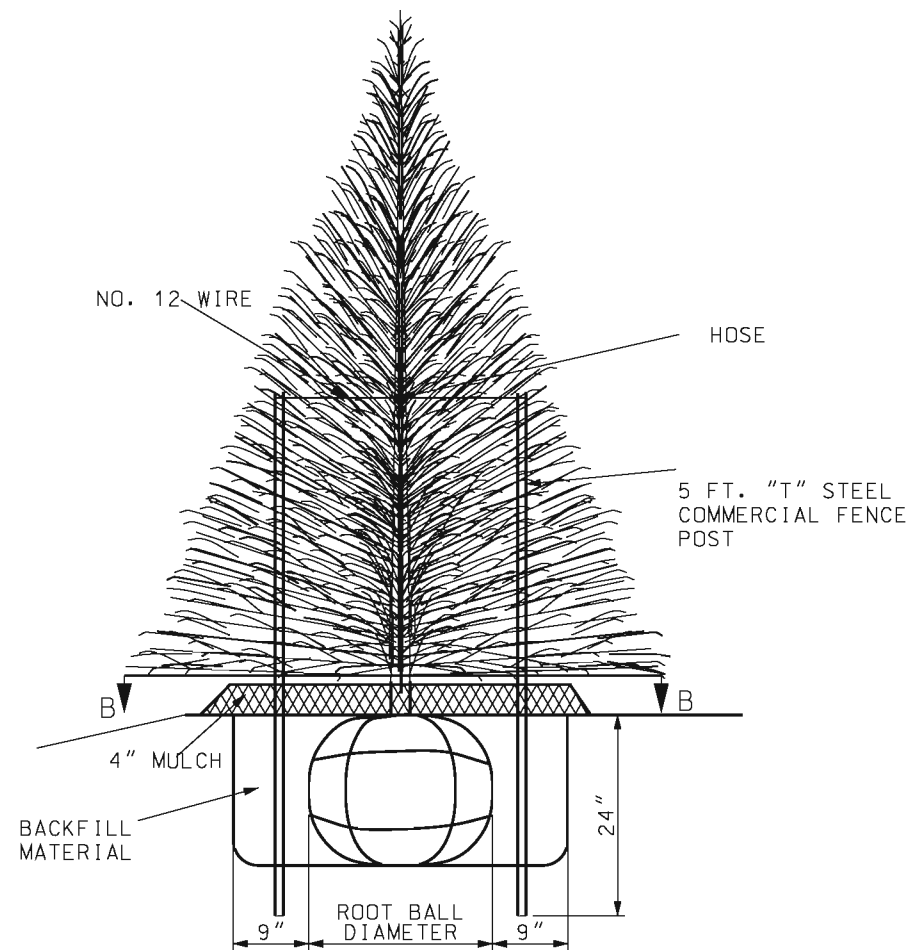
SECTION A-A



SECTION B-B



METHOD OF SUPPORTING DECIDUOUS TREES  
3" CALIBER OR LARGER



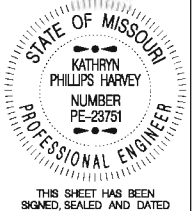
METHOD OF SUPPORTING EVERGREEN TREES  
3' OR MORE IN HEIGHT

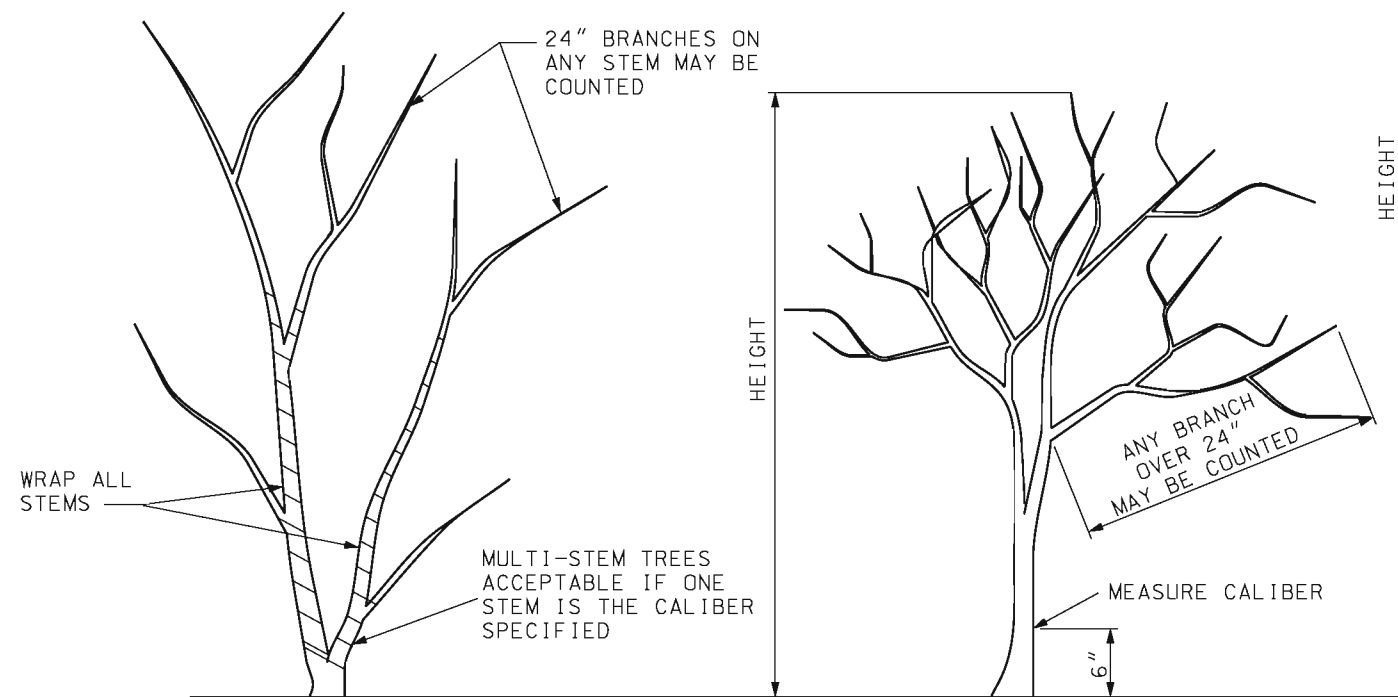
NOTES:

- TREE WRAP SHALL BE INSTALLED BEFORE BRACING.
- BRACE SHALL BE NAILED SECURELY TO POST AND BRACE BLOCK.
- BANDING SHALL BE DONE WITH A COMMERCIAL BANDING MACHINE.

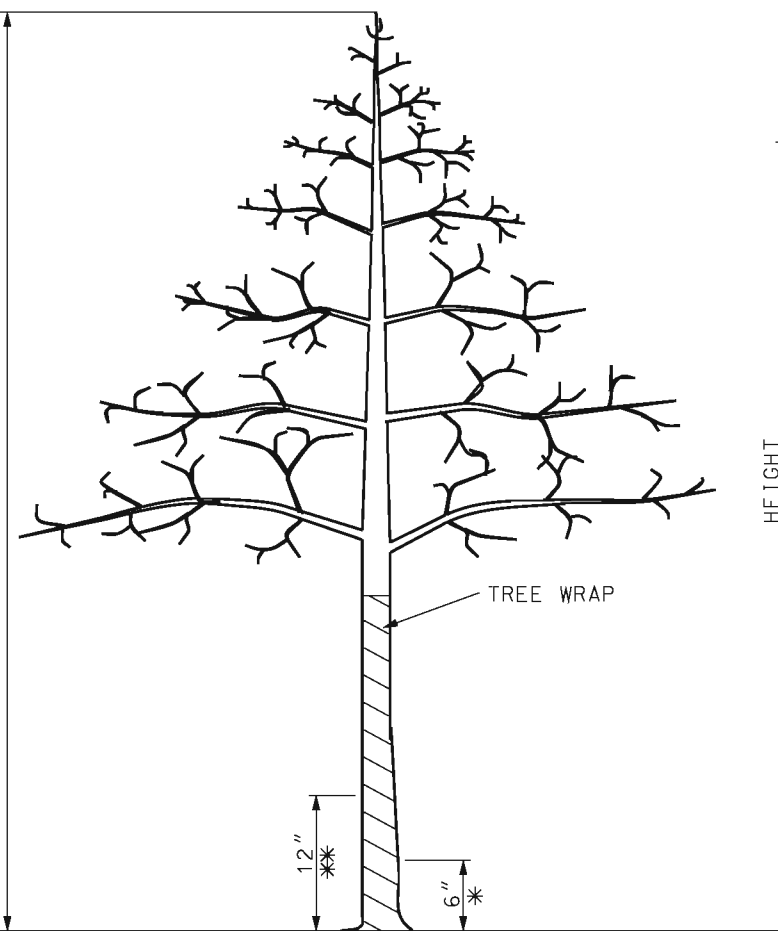
GENERAL NOTE:

ALL NUMBER MEASUREMENTS ARE NOMINAL.

|                                                                                                                                                                                                                                  |                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                            |
|                                                                                                                                             | <b>TYPICAL PLANTING ILLUSTRATIONS</b><br>METHOD OF SUPPORT |
| DATE EFFECTIVE: 07/01/2004<br>DATE PREPARED: 8/26/2009                                                                                                                                                                           | <b>808.00</b>                                              |
| SHEET NO.<br>1 OF 3                                                                                                                                                                                                              |                                                            |



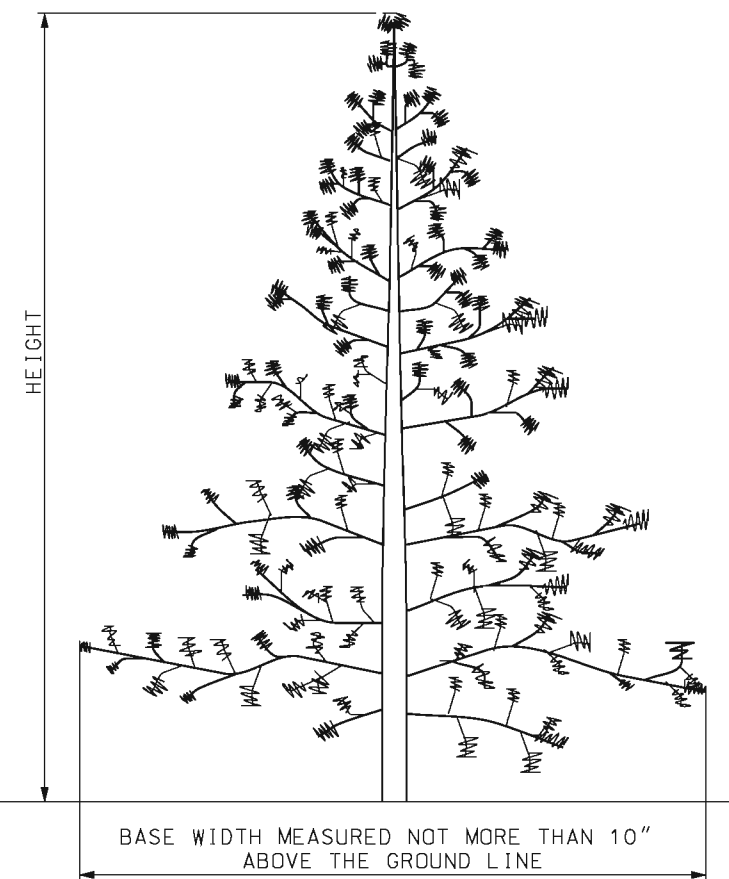
MEASUREMENT OF  
SMALL TREES



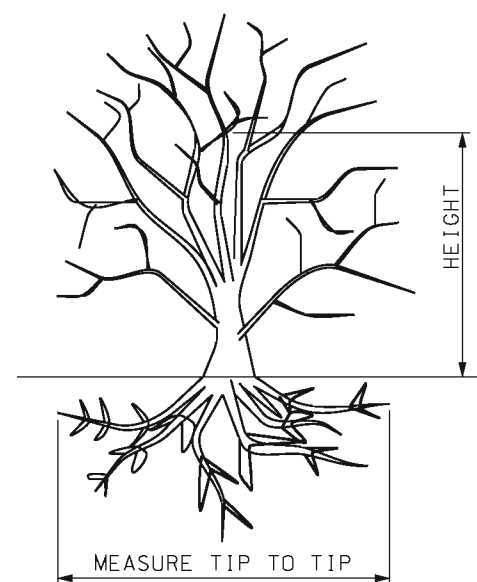
\* MEASURE CALIBER FOR  
TREES 4" OR LESS.

\*\* MEASURE CALIBER FOR  
TREES MORE THAN 4".

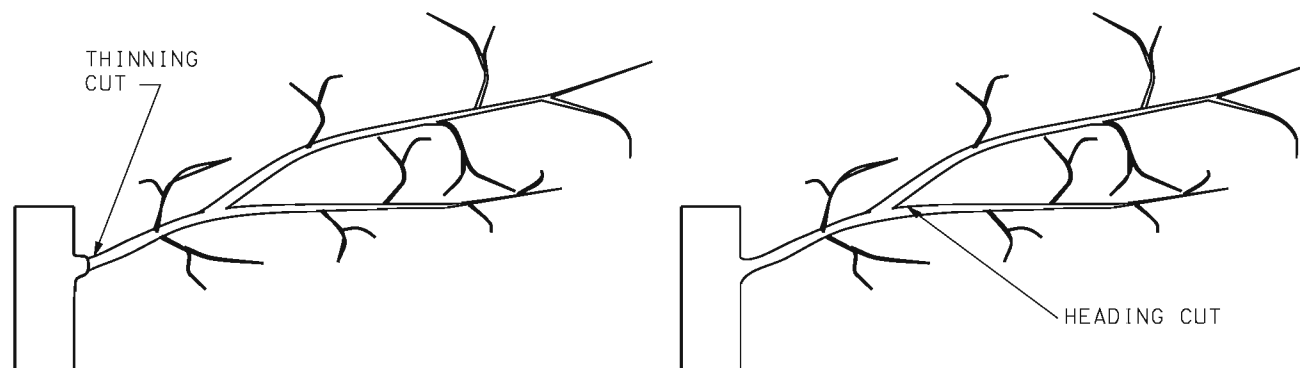
MEASUREMENT OF  
LARGE TREES



MEASUREMENT OF  
EVERGREEN TREES

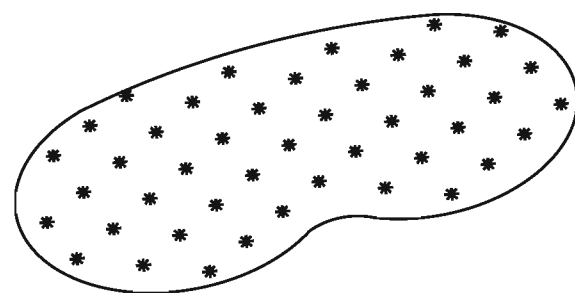
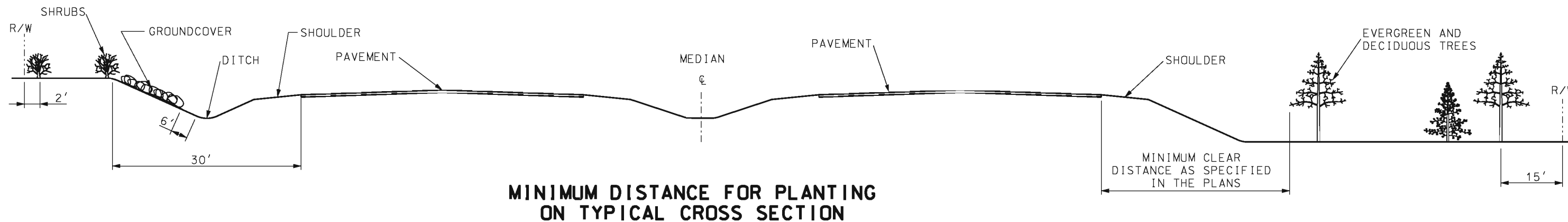


MEASUREMENT OF  
DECIDUOUS SHRUBS

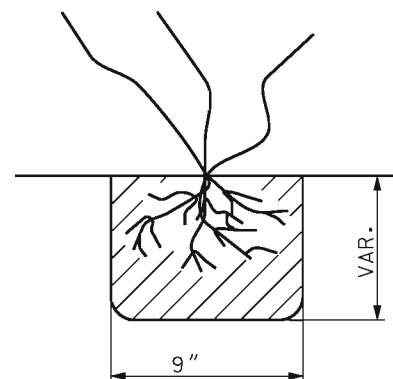


PRUNING CUTS

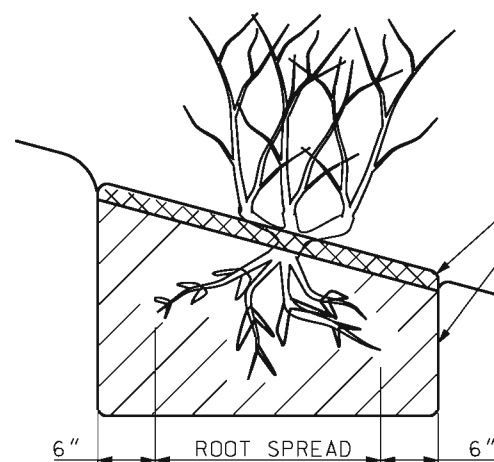
|                                                                                                                                                                                                                                  |                                                                       |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                       |                     |
|                                                                                                                                             | <b>TYPICAL PLANTING ILLUSTRATIONS</b><br>MEASUREMENT AND PRUNING CUTS |                     |
|                                                                                                                                                                                                                                  |                                                                       |                     |
| DATE EFFECTIVE: 07/01/2004<br>DATE PREPARED: 8/26/2009                                                                                                                                                                           | <b>808.00</b>                                                         | SHEET NO.<br>2 OF 3 |



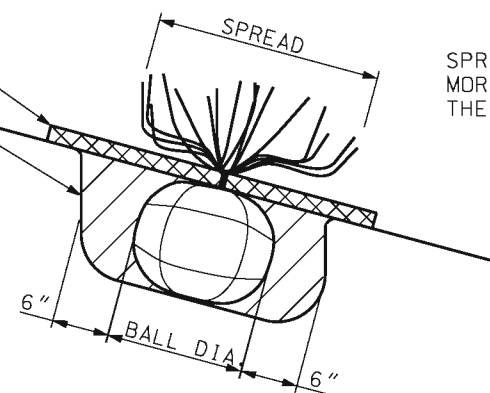
LOCATION OF SHRUBS  
IN A TYPICAL PLANT BED



VINES AND SEEDLINGS

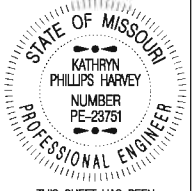


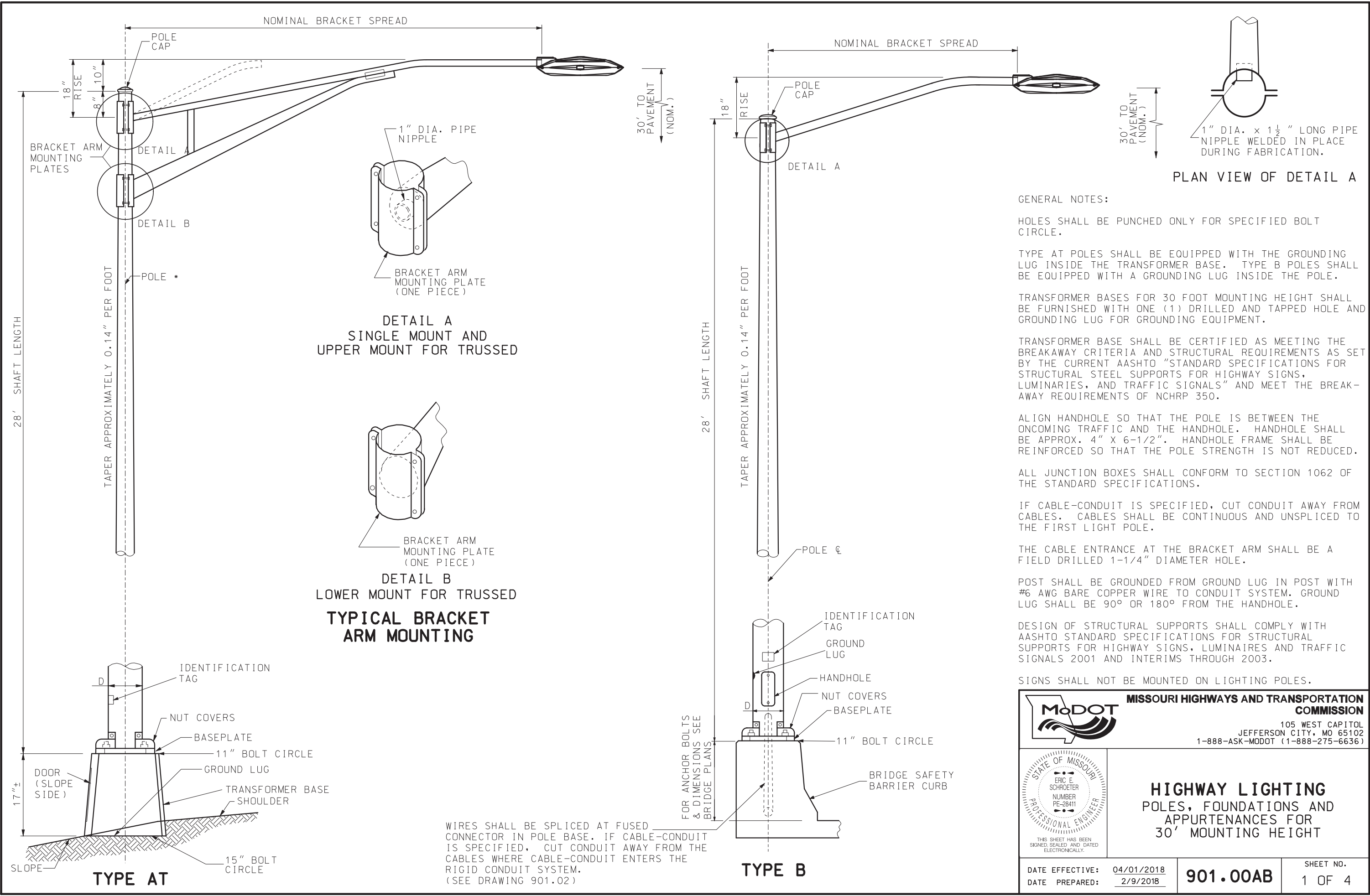
DECIDUOUS SHRUB  
SLOPE PLANTING



EVERGREEN SHRUB  
SLOPE PLANTING

SPREAD MEASURED NO  
MORE THAN 10" ABOVE  
THE GROUND LINE.

|                                                                                                                                                                                                                                  |                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                      |
|                                                                                                                                             | <b>TYPICAL PLANTING ILLUSTRATIONS</b><br>LOCATION AND SLOPE PLANTING |
| DATE EFFECTIVE: 07/01/2004<br>DATE PREPARED: 8/26/2009                                                                                                                                                                           | <b>808.00</b>                                                        |
| SHEET NO.<br><b>3 OF 3</b>                                                                                                                                                                                                       |                                                                      |



GENERAL NOTES:

HOLES SHALL BE PUNCHED ONLY FOR SPECIFIED BOLT CIRCLE.

TYPE AT POLES SHALL BE EQUIPPED WITH THE GROUNDING LUG INSIDE THE TRANSFORMER BASE. TYPE B POLES SHALL BE EQUIPPED WITH A GROUNDING LUG INSIDE THE POLE.

TRANSFORMER BASES FOR 30 FOOT MOUNTING HEIGHT SHALL BE FURNISHED WITH ONE (1) DRILLED AND TAPPED HOLE AND GROUNDING LUG FOR GROUNDING EQUIPMENT.

TRANSFORMER BASE SHALL BE CERTIFIED AS MEETING THE BREAKAWAY CRITERIA AND STRUCTURAL REQUIREMENTS AS SET BY THE CURRENT AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL STEEL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES, AND TRAFFIC SIGNALS" AND MEET THE BREAK-AWAY REQUIREMENTS OF NCHRP 350.

ALIGN HANDHOLE SO THAT THE POLE IS BETWEEN THE ONCOMING TRAFFIC AND THE HANDHOLE. HANDHOLE SHALL BE APPROX. 4" X 6-1/2". HANDHOLE FRAME SHALL BE REINFORCED SO THAT THE POLE STRENGTH IS NOT REDUCED.

ALL JUNCTION BOXES SHALL CONFORM TO SECTION 1062 OF THE STANDARD SPECIFICATIONS.

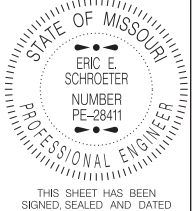
IF CABLE-CONDUIT IS SPECIFIED, CUT CONDUIT AWAY FROM CABLES. CABLES SHALL BE CONTINUOUS AND UNSPLICED TO THE FIRST LIGHT POLE.

THE CABLE ENTRANCE AT THE BRACKET ARM SHALL BE A FIELD DRILLED 1-1/4" DIAMETER HOLE.

POST SHALL BE GROUNDED FROM GROUND LUG IN POST WITH #6 AWG BARE COPPER WIRE TO CONDUIT SYSTEM. GROUND LUG SHALL BE 90° OR 180° FROM THE HANDHOLE.

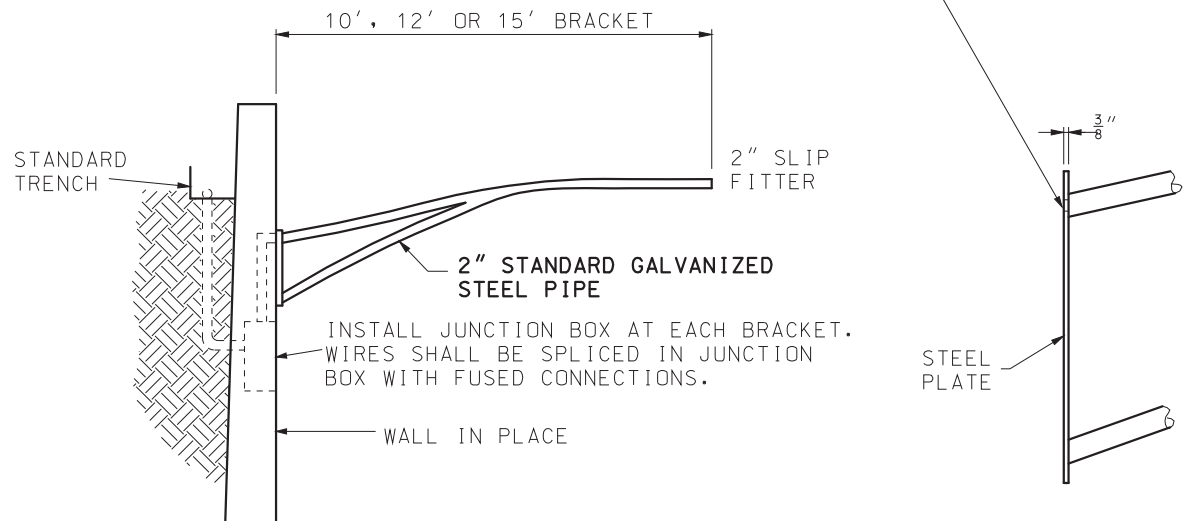
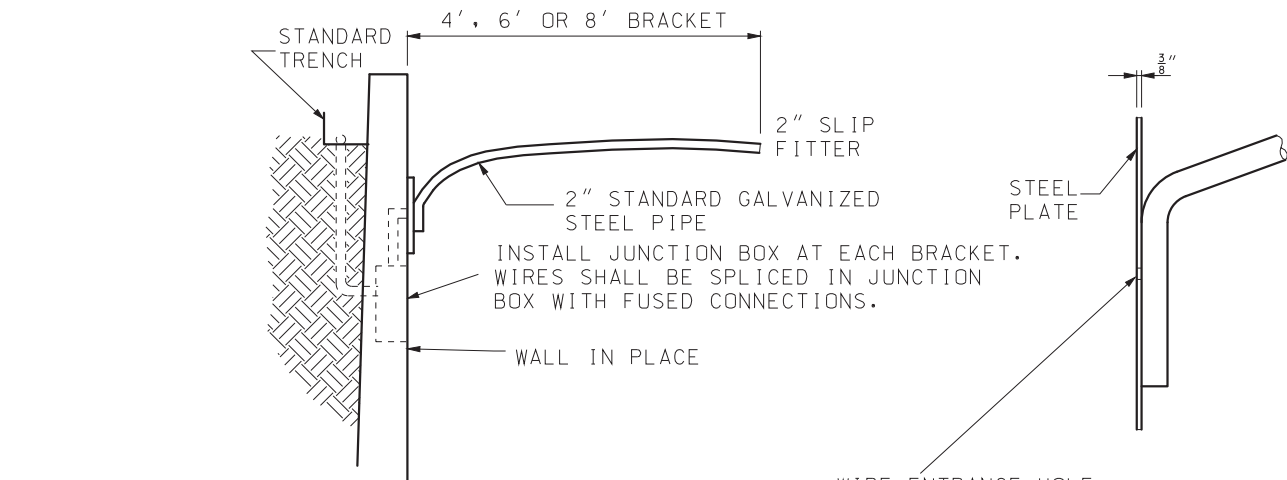
DESIGN OF STRUCTURAL SUPPORTS SHALL COMPLY WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS 2001 AND INTERIMS THROUGH 2003.

SIGNS SHALL NOT BE MOUNTED ON LIGHTING POLES.

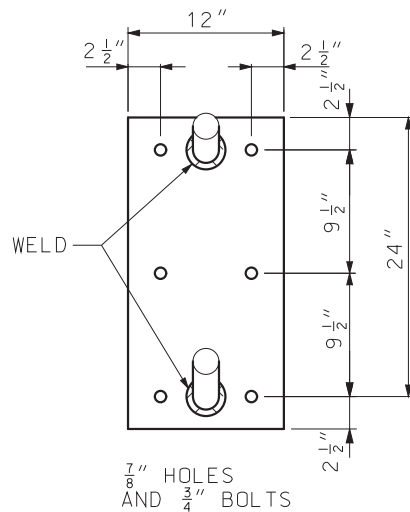
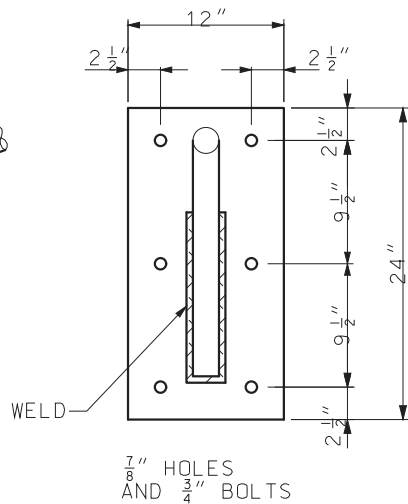
|                                                                                                                                                                                                                                  |                                                                                      |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                      |                 |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>HIGHWAY LIGHTING POLES, FOUNDATIONS AND APPURTENANCES FOR 30' MOUNTING HEIGHT</b> |                 |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 04/01/2018<br>DATE PREPARED: 2/9/2018                                | <b>901.00AB</b> |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

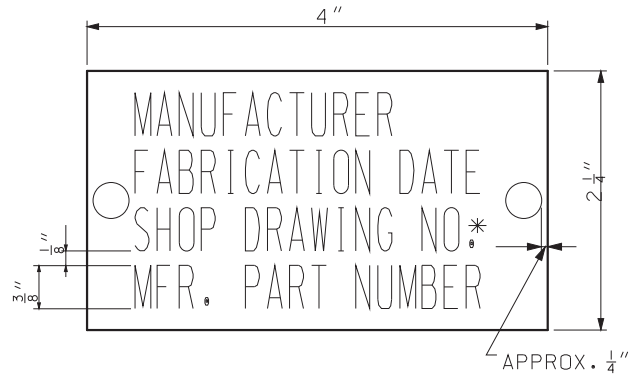




WALL BRACKETS



FACE PLATE DETAILS



IDENTIFICATION TAG

ID TAG NOTE:  
TAG SHALL BE ALUMINUM OR  
STAINLESS STEEL AND ATTACHED  
TO POLE USING TWO RIVETS OR  
STAINLESS STEEL DRIVE SCREWS.  
\* INCLUDING REVISION

GENERAL NOTES:

HOLES SHALL BE PUNCHED ONLY FOR SPECIFIED BOLT  
CIRCLE.

TYPE AT POLES SHALL BE EQUIPPED WITH THE GROUNDING  
LUG INSIDE THE TRANSFORMER BASE. TYPE B POLES SHALL  
BE EQUIPPED WITH A GROUNDING LUG INSIDE THE POLE.

TRANSFORMER BASES FOR 30 FOOT MOUNTING HEIGHT SHALL  
BE FURNISHED WITH ONE (1) DRILLED AND TAPPED HOLE AND  
GROUNDING LUG FOR GROUNDING EQUIPMENT.

TRANSFORMER BASE SHALL BE CERTIFIED AS MEETING THE  
BREAKAWAY CRITERIA AND STRUCTURAL REQUIREMENTS AS  
SET BY THE CURRENT AASHTO "STANDARD SPECIFICATIONS  
FOR STRUCTURAL STEEL SUPPORTS FOR HIGHWAY SIGNS,  
LUMINARIES, AND TRAFFIC SIGNALS" AND MEET THE BREAK-  
AWAY REQUIREMENTS OF NCHRP 350.

ALIGN HANDHOLE SO THAT THE POLE IS BETWEEN THE  
ONCOMING TRAFFIC AND THE HANDHOLE. HANDHOLE SHALL  
BE APPROX. 4" X 6-1/2". HANDHOLE FRAME SHALL BE  
REINFORCED SO THAT THE POLE STRENGTH IS NOT REDUCED.

ALL JUNCTION BOXES SHALL CONFORM TO SECTION 1062 OF  
THE STANDARD SPECIFICATIONS.

IF CABLE-CONDUIT IS SPECIFIED, CUT CONDUIT AWAY FROM  
CABLES. CABLES SHALL BE CONTINUOUS AND UNSPLICED TO  
THE FIRST LIGHT POLE.

THE CABLE ENTRANCE AT THE BRACKET ARM SHALL BE A  
FIELD DRILLED 1-1/4" DIA. HOLE.

POST SHALL BE GROUNDED FROM GROUND LUG IN POST WITH  
#6 AWG BARE COPPER WIRE TO CONDUIT SYSTEM. GROUND  
LUG SHALL BE 90° OR 180° FROM THE HANDHOLE.

ID TAG HOLES SHALL BE DRILLED INTO POLE PRIOR TO  
GALVANIZING.

| LED LUMINAIRES                                           |             |           |                   |                                      |
|----------------------------------------------------------|-------------|-----------|-------------------|--------------------------------------|
| FUSE RATING                                              | DESIGNATION | MAX. WATT | DISTRIBUTION TYPE | BACKLIGHT-UPLIGHT-GLARE (BUG) RATING |
| 3 A                                                      | LED-A       | 103       | III               | B2-U0-G2                             |
| LUMINAIRE PER CHART UNLESS OTHERWISE SPECIFIED ON PLANS. |             |           |                   |                                      |

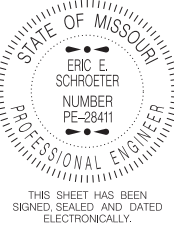
| TYPE AT POLE                    |             |                           |                        |       |
|---------------------------------|-------------|---------------------------|------------------------|-------|
| BRACKET SPREAD                  |             | 4'-10'                    | 12'                    | 15'   |
| MAX. LUMINAIRE WEIGHT           |             | 75 LB                     | 71 LB                  | 66 LB |
| MAX. PROJECTED AREA             |             | 3.3 SQ. FT.               |                        |       |
| SINGLE AND TRUSSED BRACKET ARMS |             |                           |                        |       |
| LOCATION                        | LENGTH POLE | BRACKET SPREAD            | TRANS. BASE BOLT CIRC. | D     |
| SHOULDER                        | 28'         | 4', 6', 8', 10', 12', 15' | 15"                    | 8"    |

| TYPE B POLE                   |                |                   |             |                     |       |
|-------------------------------|----------------|-------------------|-------------|---------------------|-------|
| BRACKET SPREAD                |                |                   | 4'          | 6'                  | 8'    |
| MAX. LUMINAIRE WEIGHT         |                |                   | 75 LB       | 75 LB               | 54 LB |
| MAX. PROJECTED AREA           |                |                   | 3.3 SQ. FT. |                     |       |
| SINGLE BRACKET ARM            |                |                   |             |                     |       |
| LOCATION                      | LENGTH<br>POLE | BRACKET<br>SPREAD | D           | ANCHOR BOLT<br>DIA. |       |
| BRIDGE SAFETY<br>BARRIER CURB | 28'            | 4', 6'<br>8'      | 8"          | 1"                  |       |



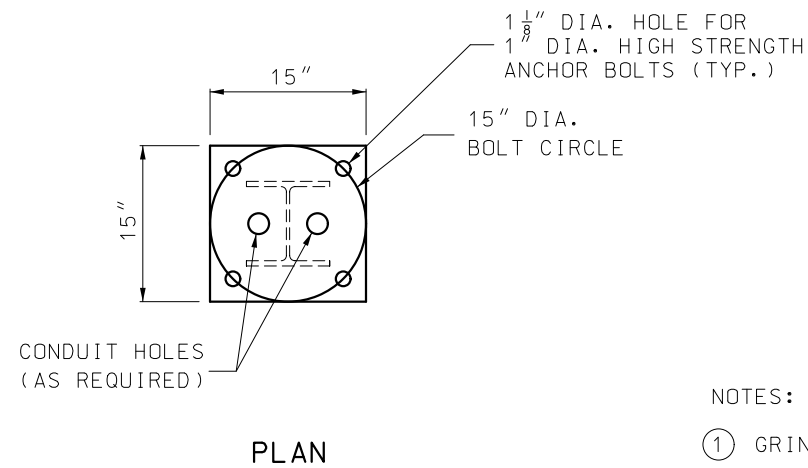
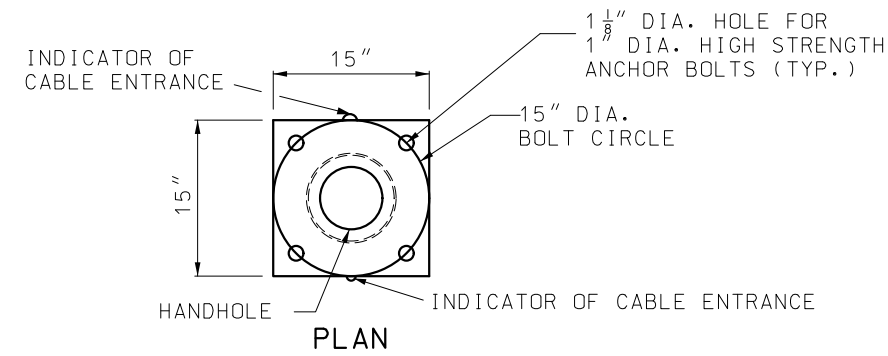
**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



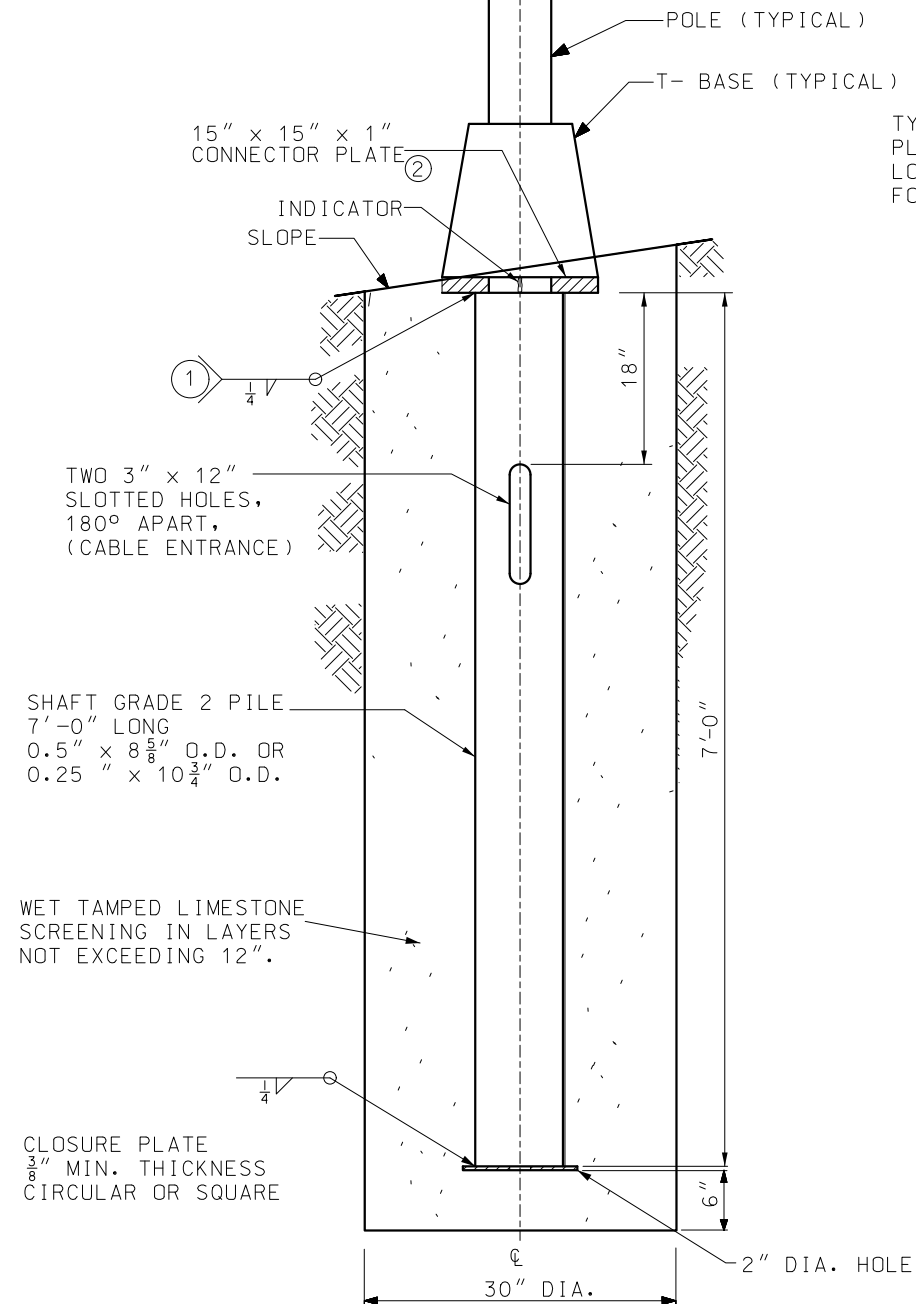
**HIGHWAY LIGHTING  
POLES, FOUNDATIONS AND  
APPURTENANCES FOR  
30' MOUNTING HEIGHT**

|                 |            |                 |                     |
|-----------------|------------|-----------------|---------------------|
| DATE EFFECTIVE: | 04/01/2018 | <b>901.00AB</b> | SHEET NO.<br>2 OF 4 |
| DATE PREPARED:  | 2/9/2018   |                 |                     |

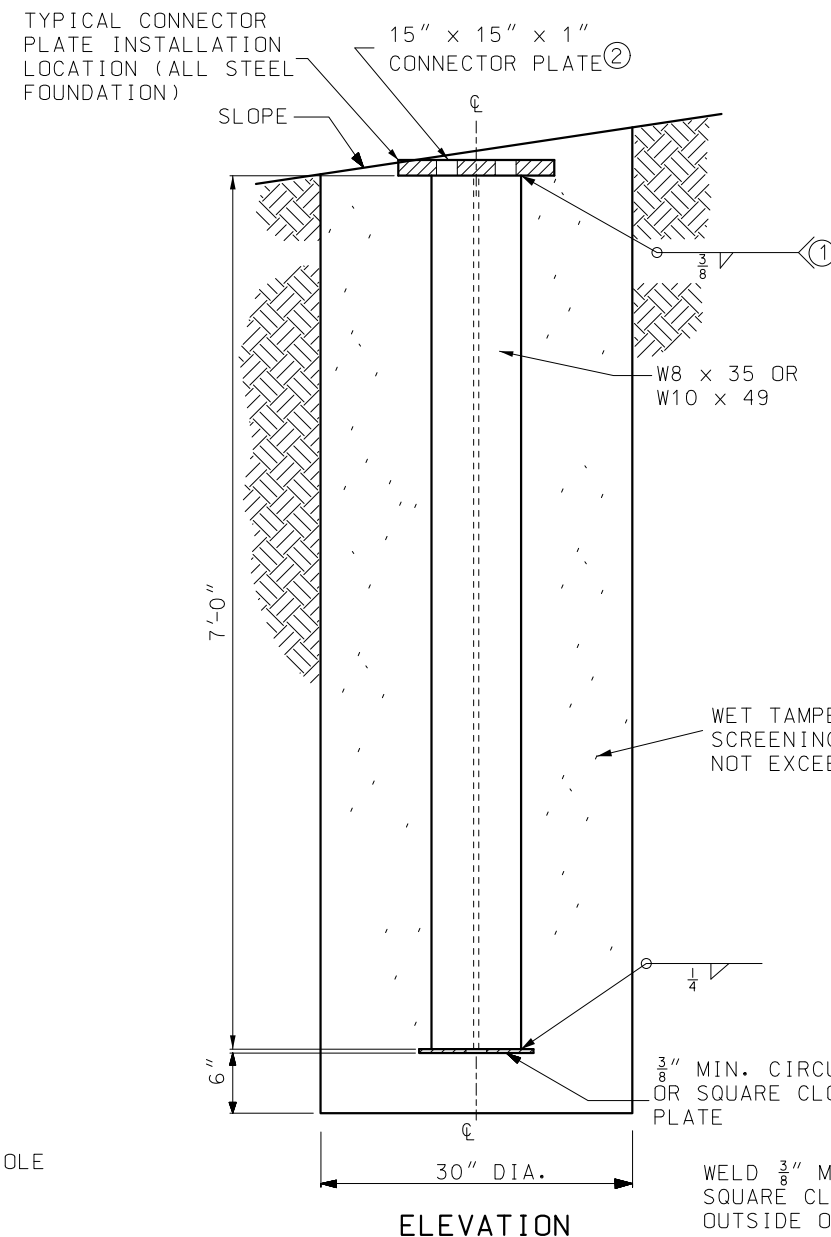


#### NOTES:

- ① GRIND WELD AS NECESSARY TO CLEAR BOLT HEAD.
- ② FOUNDATIONS SHALL BE INSTALLED SO THAT CONNECTOR PLATES ARE LEVEL PERPENDICULAR TO THE BRACKET ARM AND SLOPED FOR POLE RAKING PARALLEL TO THE BRACKET ARM.



**DETAILS OF CIRCULAR  
STEEL PILE FOUNDATION**



**DETAILS OF STEEL  
"H" PILE FOUNDATION**

#### GENERAL NOTES:

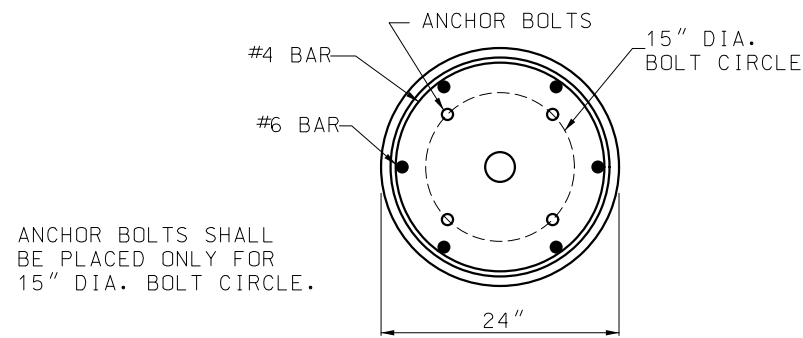
ALL CLASSIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED. SEE STANDARD SPECIFICATIONS FOR CLASSIFICATIONS NOT SHOWN.

ALL CONNECTOR PLATE AND CLOSURE PLATE THICKNESSES SHOWN ARE MINIMUM DIMENSIONS.

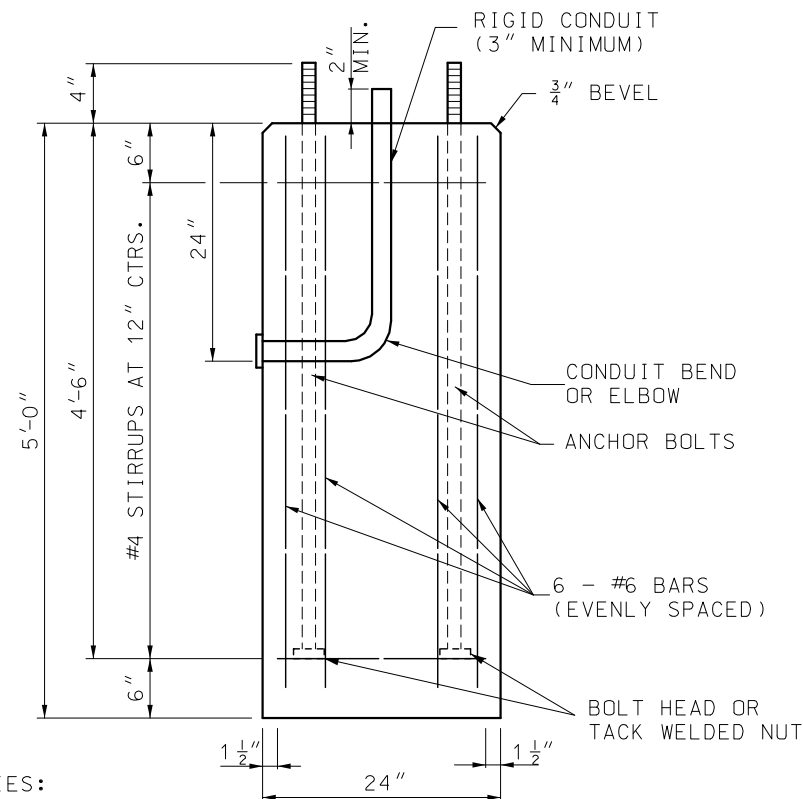
ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED 1" DIA. HIGH STRENGTH ANCHOR BOLTS.

ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED.

|                                                                                                                                                                      |                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>              |                                                                                                         |
| <p>STATE OF MISSOURI<br/>NICOLE A. KOLB HOOD<br/>NUMBER PE-2001018754<br/>PROFESSIONAL ENGINEER<br/>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>HIGHWAY LIGHTING<br/>POLES, FOUNDATIONS AND<br/>APPURTENANCES FOR<br/>30' MOUNTING HEIGHT</b></p> |
| <p>DATE EFFECTIVE: 01/01/2021<br/>DATE PREPARED: 10/14/2020</p>                                                                                                      | <p><b>901.00AB</b></p>                                                                                  |
| <p>SHEET NO.<br/>3 OF 4</p>                                                                                                                                          |                                                                                                         |

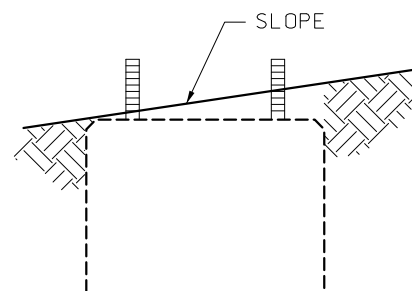


PLAN

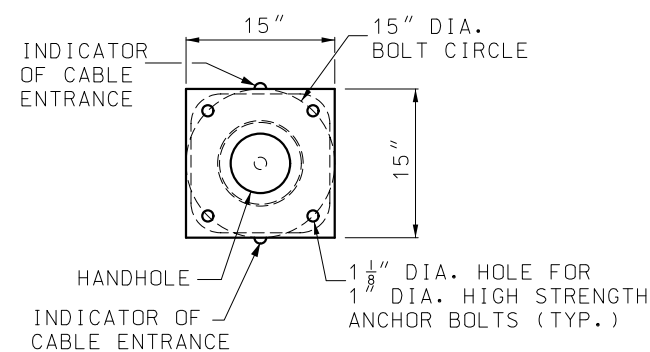


QUANTITIES:  
CONC. = 0.58 CU. YD.  
REIN. = 64 LBS.

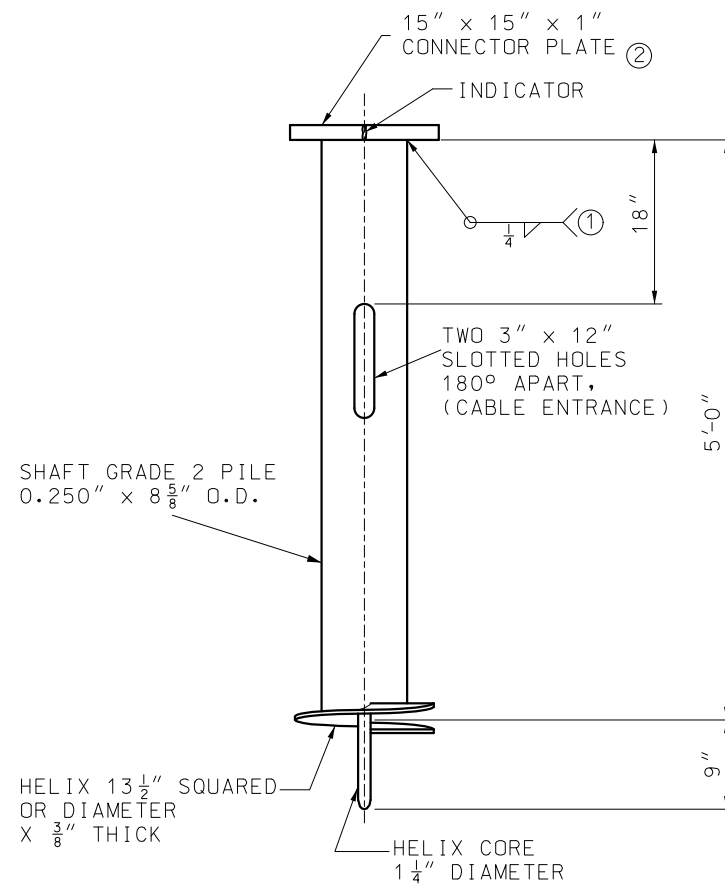
ELEVATION  
DETAILS OF CONCRETE  
FOUNDATION ③



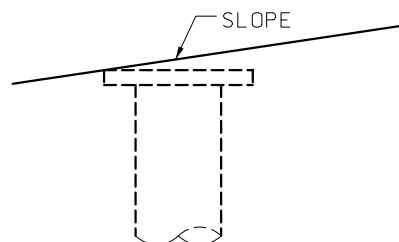
CONCRETE FOUNDATION  
EMBEDMENT



PLAN



ELEVATION  
DETAILS OF SCREW  
ANCHOR FOUNDATION



SCREW ANCHOR  
EMBEDMENT

DRIVE HOLES WILL BE PERMITTED PROVIDED THAT THEY DO NOT CONFLICT WITH OR COMPROMISE THE STRUCTURAL INTEGRITY OF THE PLATE, THE WELD BETWEEN THE PLATE AND SHAFT, OR THE BOLT HOLES.

NOTES:

- ① GRIND WELD AS NECESSARY TO CLEAR BOLT HEAD.
- ② FOUNDATIONS SHALL BE INSTALLED SO THAT CONNECTOR PLATES ARE LEVEL PERPENDICULAR TO THE BRACKET ARM AND SLOPED FOR POLE RAKING PARALLEL TO THE BRACKET ARM.
- ③ AT THE OPTION OF THE CONTRACTOR THE CONCRETE FOUNDATION MAY BE PRECAST. IF PRECAST, THEY SHALL BE SET IN DRILLED HOLES 3 FEET IN DIAMETER AND 6 INCHES DEEPER THAN THE BOTTOM OF THE CONCRETE FOUNDATION. THE BOTTOM 6 INCHES OF THE HOLE AND THE REMAINING SPACE AROUND THE FOUNDATION SHALL BE BACKFILLED WITH WET TAMPED LIMESTONE SCREENINGS IN LAYERS NOT EXCEEDING 12 INCHES.

GENERAL NOTES:

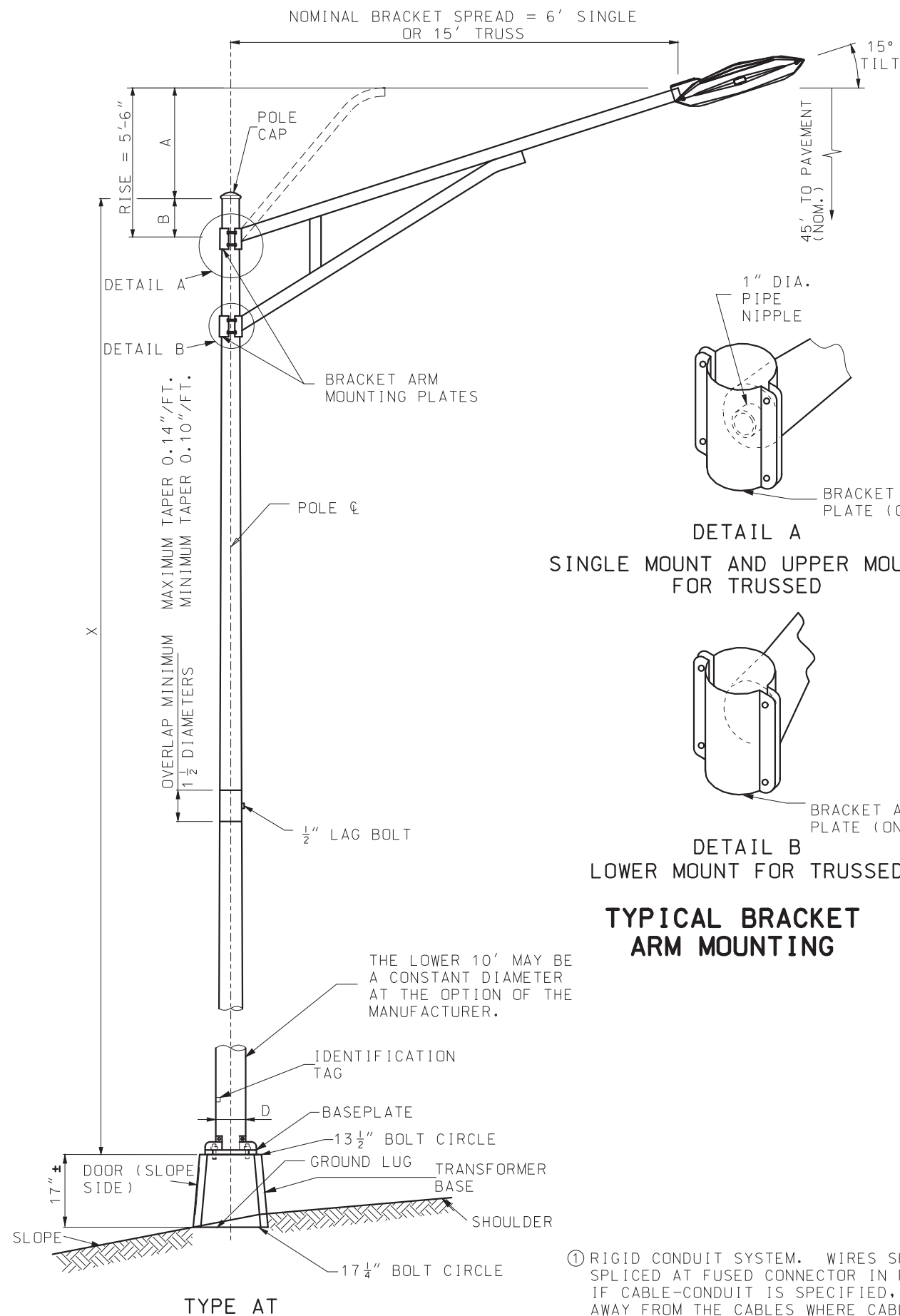
ALL CLASSIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED. SEE STANDARD SPECIFICATIONS FOR CLASSIFICATIONS NOT SHOWN.

ALL CONNECTOR PLATE AND CLOSURE PLATE THICKNESSES SHOWN ARE MINIMUM DIMENSIONS.

ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED 1" DIA. HIGH STRENGTH ANCHOR BOLTS.

ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED.

|                                                                                                                                            |                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                  |
|                                                                                                                                            | <b>HIGHWAY LIGHTING<br/>POLES, FOUNDATIONS AND<br/>APPURTENANCES FOR<br/>30' MOUNTING HEIGHT</b> |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                                                                    | <b>901.00AB</b>                                                                                  |
| SHEET NO.<br>4 OF 4                                                                                                                        |                                                                                                  |

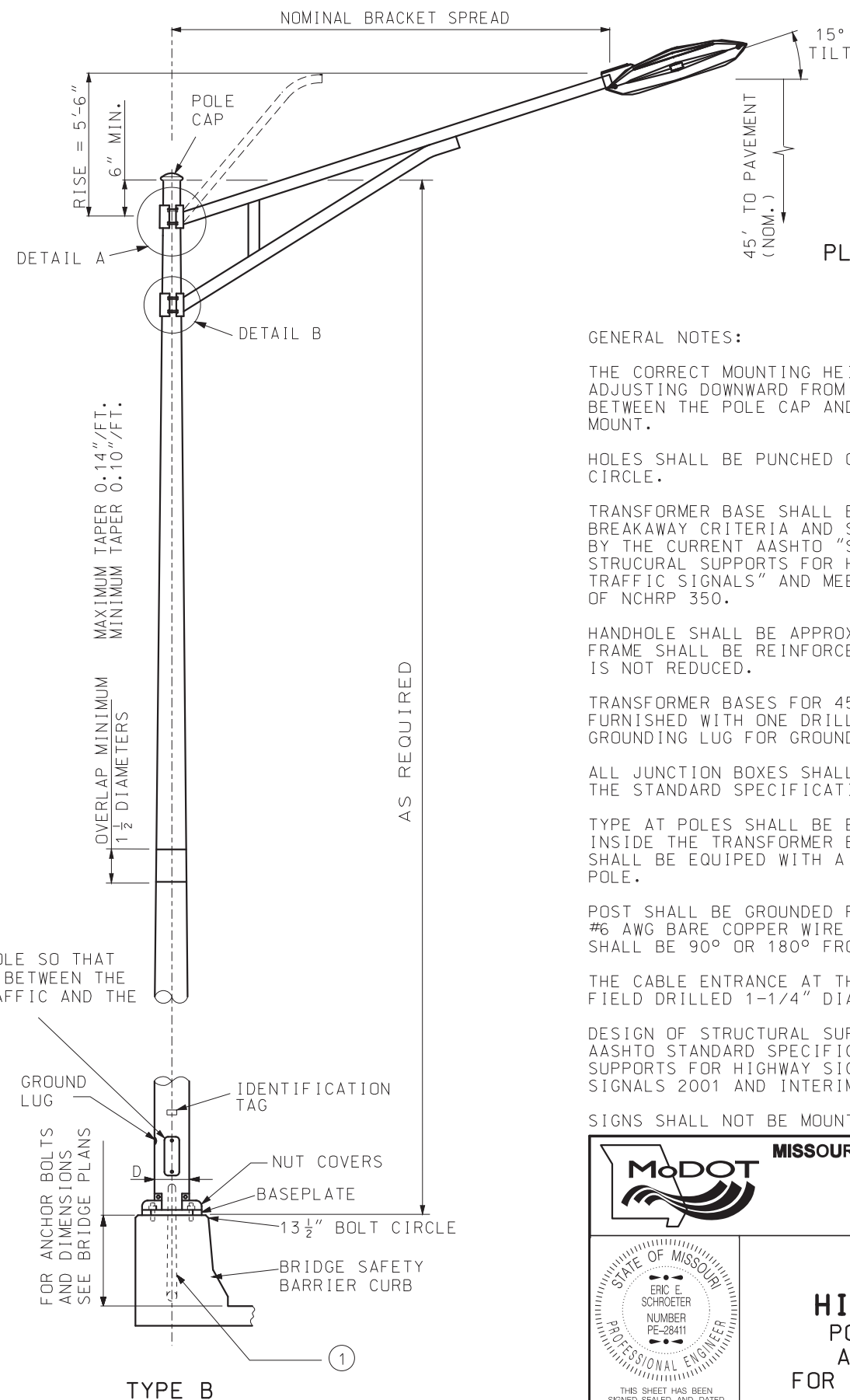


**SINGLE MOUNT AND UPPER MOUNT FOR TRUSSED**

**TYPICAL BRACKET ARM MOUNTING**

① RIGID CONDUIT SYSTEM. WIRES SHALL BE SPLICED AT FUSED CONNECTOR IN POLE BASE. IF CABLE-CONDUIT IS SPECIFIED, CUT CONDUIT AWAY FROM THE CABLES WHERE CABLE-CONDUIT ENTERS THE RIGID CONDUIT SYSTEM. (SEE DRAWING 901.02)

ALIGN HANDHOLE SO THAT THE POLE IS BETWEEN THE ONCOMING TRAFFIC AND THE HANDHOLE.



**PLAN VIEW OF DETAIL A**

1" DIA. x 1 1/2" LONG PIPE NIPPLE WELDED IN PLACE DURING FABRICATION.

**GENERAL NOTES:**

THE CORRECT MOUNTING HEIGHT WILL BE OBTAINED BY ADJUSTING DOWNWARD FROM THE 6" MINIMUM CLEARANCE BETWEEN THE POLE CAP AND THE TOP OF THE BRACKET ARM MOUNT.

HOLES SHALL BE PUNCHED ONLY FOR SPECIFIED BOLT CIRCLE.

TRANSFORMER BASE SHALL BE CERTIFIED AS MEETING THE BREAKAWAY CRITERIA AND STRUCTURAL REQUIREMENTS AS SET BY THE CURRENT AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS" AND MEET THE BREAKAWAY REQUIREMENTS OF NCHRP 350.

HANDHOLE SHALL BE APPROX. 4" X 6-1/2". HANDHOLE FRAME SHALL BE REINFORCED SO THAT THE POLE STRENGTH IS NOT REDUCED.

TRANSFORMER BASES FOR 45' MOUNTING HEIGHT SHALL BE FURNISHED WITH ONE DRILLED AND TAPPED HOLE AND GROUNDING LUG FOR GROUNDING EQUIPMENT.

ALL JUNCTION BOXES SHALL CONFORM TO SECTION 1062 OF THE STANDARD SPECIFICATIONS.

TYPE AT POLES SHALL BE EQUIPED WITH THE GROUNDING LUG INSIDE THE TRANSFORMER BASE. TYPE B AND MB POLES SHALL BE EQUIPED WITH A GROUNDING LUG INSIDE THE POLE.

POST SHALL BE GROUNDED FROM GROUND LUG IN POST WITH #6 AWG BARE COPPER WIRE TO CONDUIT SYSTEM. GROUND LUG SHALL BE 90° OR 180° FROM HANDHOLE.

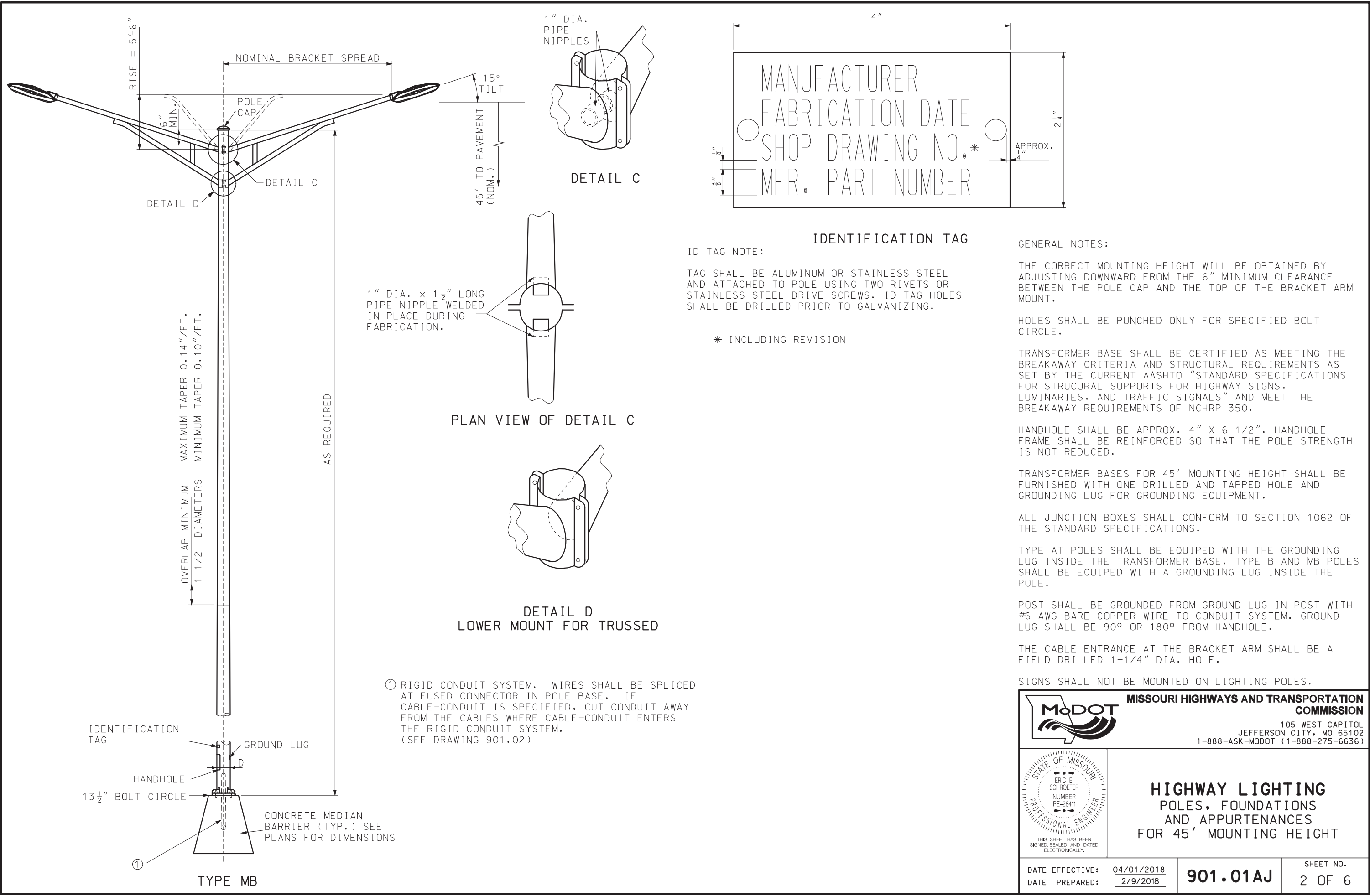
THE CABLE ENTRANCE AT THE BRACKET ARM SHALL BE A FIELD DRILLED 1-1/4" DIA. HOLE.

DESIGN OF STRUCTURAL SUPPORTS SHALL COMPLY WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS 2001 AND INTERIMS THROUGH 2003.

SIGNS SHALL NOT BE MOUNTED ON LIGHTING POLES.

|                                                                                                                                                                  |                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p>          |                                                                                             |
| <p>STATE OF MISSOURI<br/>ERIC E. SCHROETER<br/>NUMBER PE-28411<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <p><b>HIGHWAY LIGHTING POLES, FOUNDATIONS AND APPURTENANCES FOR 45' MOUNTING HEIGHT</b></p> |
| <p>DATE EFFECTIVE: 04/01/2018</p> <p>DATE PREPARED: 2/9/2018</p>                                                                                                 | <p><b>901.01AJ</b></p>                                                                      |
| <p>SHEET NO. 1 OF 6</p>                                                                                                                                          |                                                                                             |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

| TYPE AT POLE           |     |             |         |                 |
|------------------------|-----|-------------|---------|-----------------|
| BRACKET SPREAD         |     | 6' OR 15'   |         |                 |
| MAX. LUMINAIRE WEIGHT  |     | 60 LB       |         |                 |
| MAX. PROJECTED AREA    |     | 3.3 SQ. FT. |         |                 |
| AT-45<br>DESIGN<br>NO. | X   | A           | B       | D*<br>(NOMINAL) |
| 1                      | 50' | VAR.        | 6" MIN. | 10"             |
| 2                      | 45' | VAR.        | 6" MIN. | 10"             |
| 3                      | 40' | VAR.        | 6" MIN. | 10"             |
| 4                      | 35' | VAR.        | 6" MIN. | 10"             |
| 5                      | 30' | VAR.        | 6" MIN. | 10"             |

\* THE MINIMUM ALTERNATE DIAMETER SHALL BE 10" FOR A 50' POLE, 9-1/2" FOR A 45' POLE, 9" FOR A 40' POLE, 8-1/2" FOR A 35' POLE AND 8" FOR A 30' POLE.

| TYPE B POLE                   |                |             |                     |
|-------------------------------|----------------|-------------|---------------------|
| BRACKET SPREAD                |                | 6' OR 15'   |                     |
| MAX. LUMINAIRE WEIGHT         |                | 60 LB       |                     |
| MAX. PROJECTED AREA           |                | 3.3 SQ. FT. |                     |
| SINGLE BRACKET ARM            |                |             |                     |
| LOCATION                      | BRACKET SPREAD | D<br>NOM.   | ANCHOR<br>BOLT DIA. |
| BRIDGE SAFETY<br>BARRIER CURB | 6'             | 10"         | 1-1/4"              |
| TRUSSED BRACKET ARM           |                |             |                     |
| LOCATION                      | BRACKET SPREAD | D<br>NOM.   | ANCHOR<br>BOLT DIA. |
| BRIDGE SAFETY<br>BARRIER CURB | 15'            | 10"         | 1-1/4"              |

| LED LUMINAIRES                                              |             |           |                      |                                         |
|-------------------------------------------------------------|-------------|-----------|----------------------|-----------------------------------------|
| FUSE RATING                                                 | DESIGNATION | MAX. WATT | DISTRIBUTION<br>TYPE | BACKLIGHT-UPLIGHT-GLARE<br>(BUG) RATING |
| 3 A                                                         | LED-A       | 103       | III                  | B2-U0-G2                                |
| 5 A                                                         | LED-B       | 170       | III                  | B3-U0-G3                                |
| 7 A                                                         | LED-C       | 275       | III                  | B3-U0-G3                                |
| LUMINAIRE PER CHART UNLESS OTHERWISE SPECIFIED<br>ON PLANS. |             |           |                      |                                         |

GENERAL NOTES:

THE CORRECT MOUNTING HEIGHT WILL BE OBTAINED BY ADJUSTING DOWNWARD FROM THE 6" MINIMUM CLEARANCE BETWEEN THE POLE CAP AND THE TOP OF THE BRACKET ARM MOUNT.

HOLES SHALL BE PUNCHED ONLY FOR SPECIFIED BOLT CIRCLE.

TRANSFORMER BASE SHALL BE CERTIFIED AS MEETING THE BREAKAWAY CRITERIA AND STRUCTURAL REQUIREMENTS AS SET BY THE CURRENT AASHTO "STANDARD SPECIFICATIONS FOR STRUCURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES, AND TRAFFIC SIGNALS" AND MEET THE BREAKAWAY REQUIREMENTS OF NCHRP 350.

HANDHOLE SHALL BE APPROX. 4" X 6 1/2". HANDHOLE FRAME SHALL BE REINFORCED SO THAT THE POLE STRENGTH IS NOT REDUCED.

TRANSFORMER BASES FOR 45' MOUNTING HEIGHT SHALL BE FURNISHED WITH ONE DRILLED AND TAPPED HOLE AND GROUNDING LUG FOR GROUNDING EQUIPMENT.

ALL JUNCTION BOXES SHALL CONFORM TO SECTION 1062 OF THE STANDARD SPECIFICATIONS.

TYPE AT POLES SHALL BE EQUIPED WITH THE GROUNDING LUG INSIDE THE TRANSFORMER BASE. TYPE B AND MB POLES SHALL BE EQUIPED WITH A GROUNDING LUG INSIDE THE POLE.

POST SHALL BE GROUNDED FROM GROUND LUG IN POST WITH #6 AWG BARE COPPER WIRE TO CONDUIT SYSTEM. GROUND LUG SHALL BE 90° OR 180° FROM HANDHOLE.

THE CABLE ENTRANCE AT THE BRACKET ARM SHALL BE A FIELD DRILLED 1 1/4" DIA. HOLE.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

ERIC E. SCHROETER

NUMBER PE-28411

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

HIGHWAY LIGHTING  
POLES, FOUNDATIONS  
AND APPURTENANCES  
FOR 45' MOUNTING HEIGHT

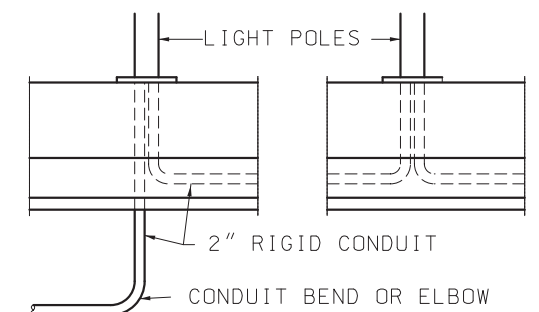
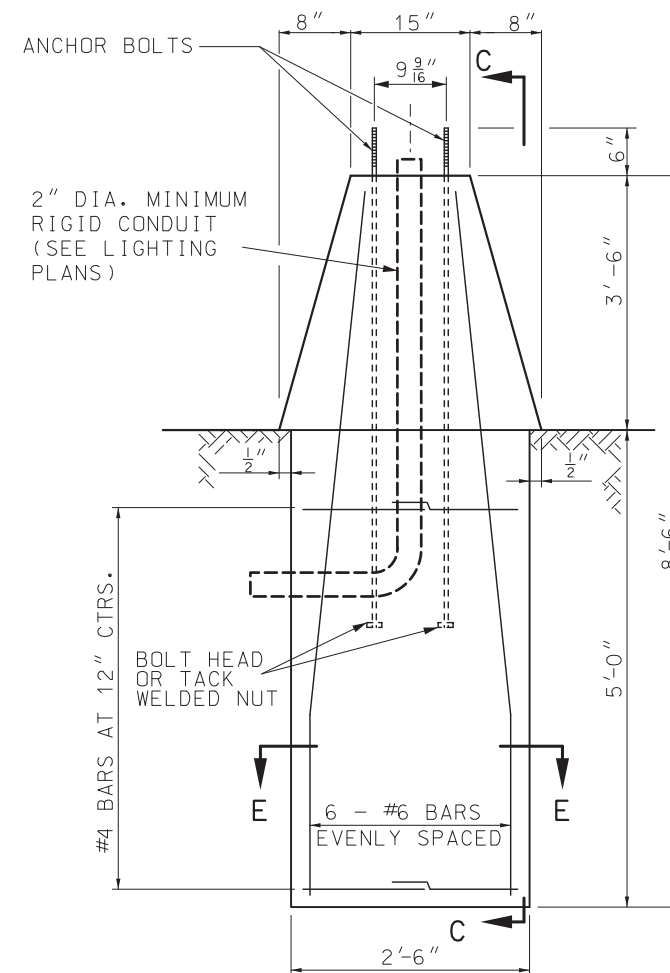
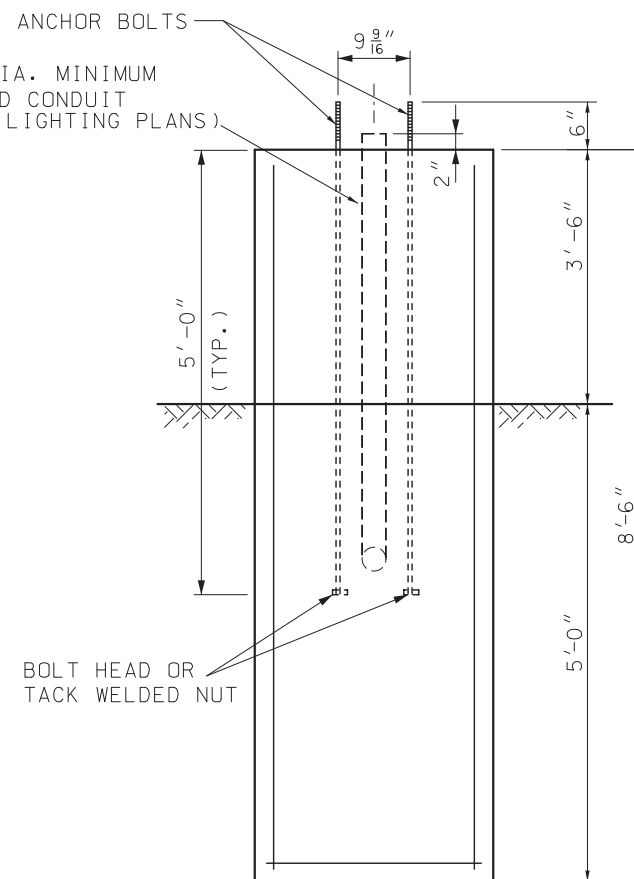
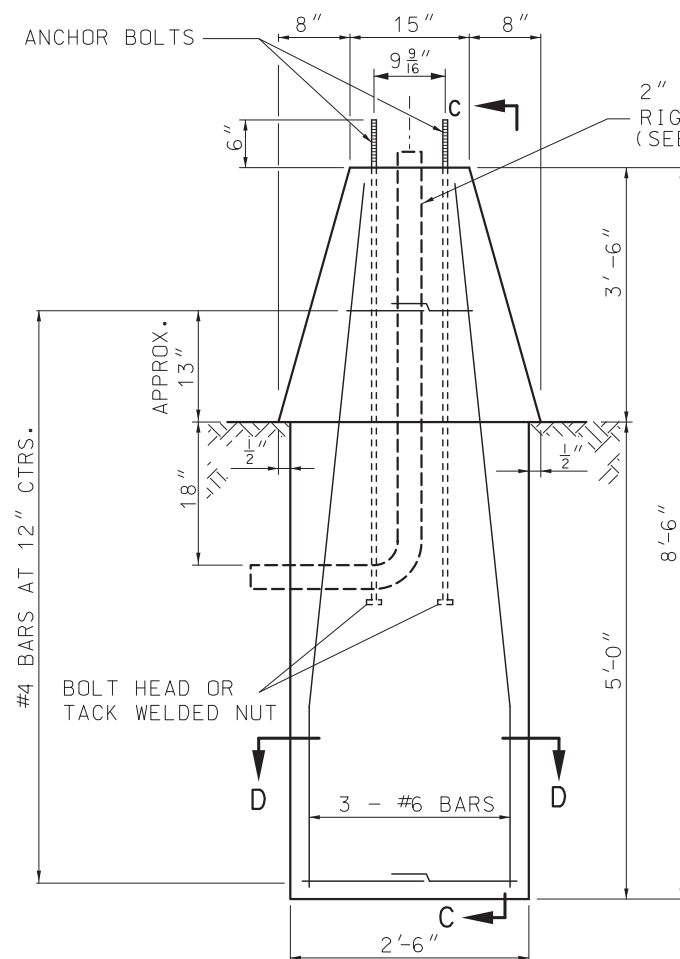
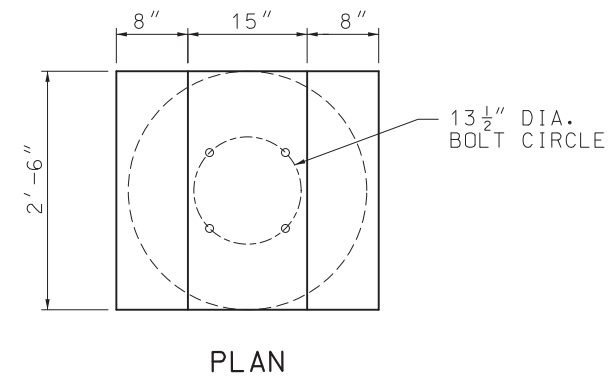
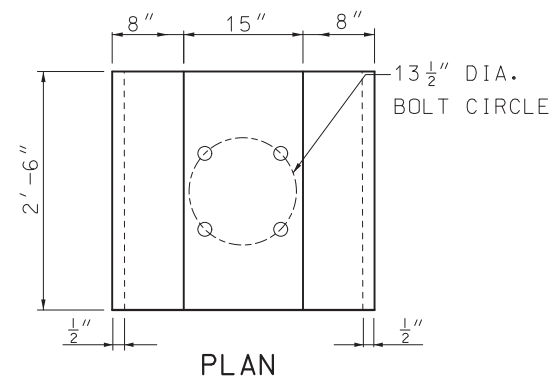
DATE EFFECTIVE: 04/01/2018  
DATE PREPARED: 2/9/2018

901.01AJ

SHEET NO.  
3 OF 6

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



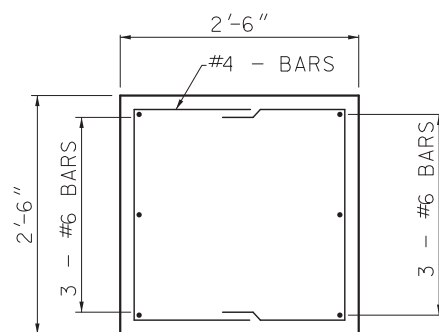


#### GENERAL NOTES:

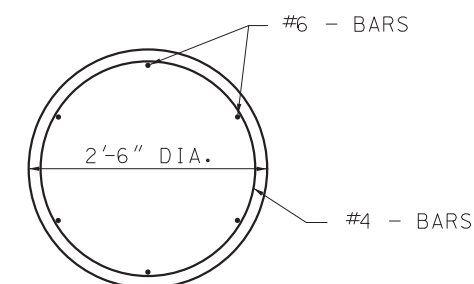
ALL FOUNDATIONS SHALL INCLUDE 4 ANCHOR BOLTS AND NUTS PLACED AS SHOWN.

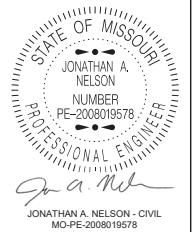
ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED 1 1/4" DIAMETER HIGH STRENGTH ANCHOR BOLTS.

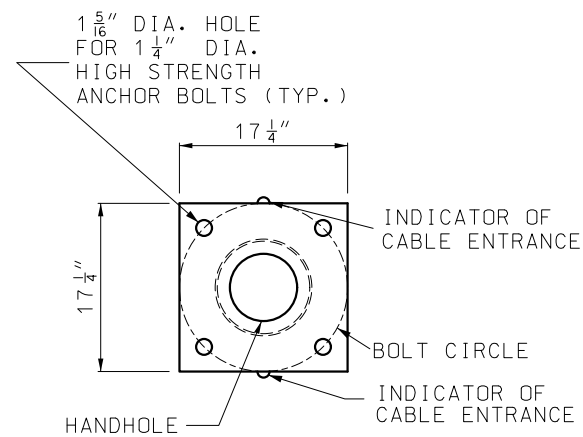
TONGUE AND GROOVE REQUIRED ON MEDIAN BARRIER SECTION FOR TYPE MB POLES WHEN ADJACENT MEDIAN BARRIER IS PRECAST, FOR DETAILS, SEE STANDARD PLANS.



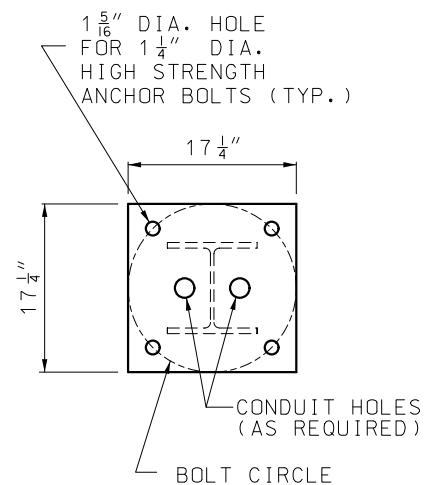
### CONCRETE MEDIAN BARRIER AND FOUNDATION DESIGN FOR TYPE MB LIGHT POLE



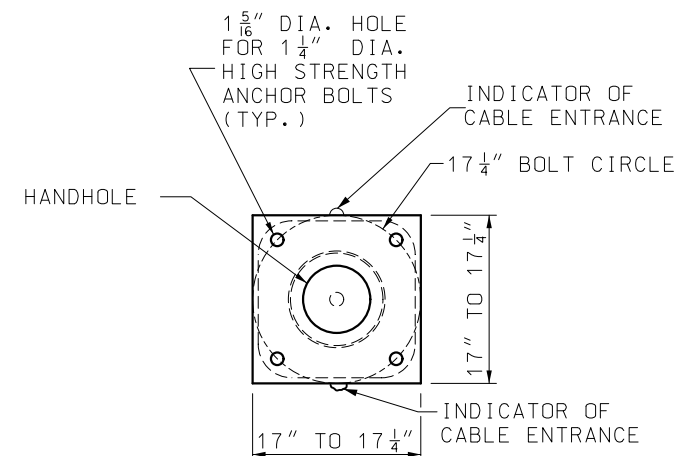
|                                                                                                                                                                                                                                  |                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                      |
|                                                                                                                                             | <b>HIGHWAY LIGHTING POLES, FOUNDATIONS AND APPURTENANCES FOR 45' MOUNTING HEIGHT</b> |
| DATE EFFECTIVE: 04/01/2025<br>DATE PREPARED: 12/16/2024                                                                                                                                                                          | <b>901.01AJ</b>                                                                      |
| SHEET NO. 4 OF 6                                                                                                                                                                                                                 |                                                                                      |



PLAN

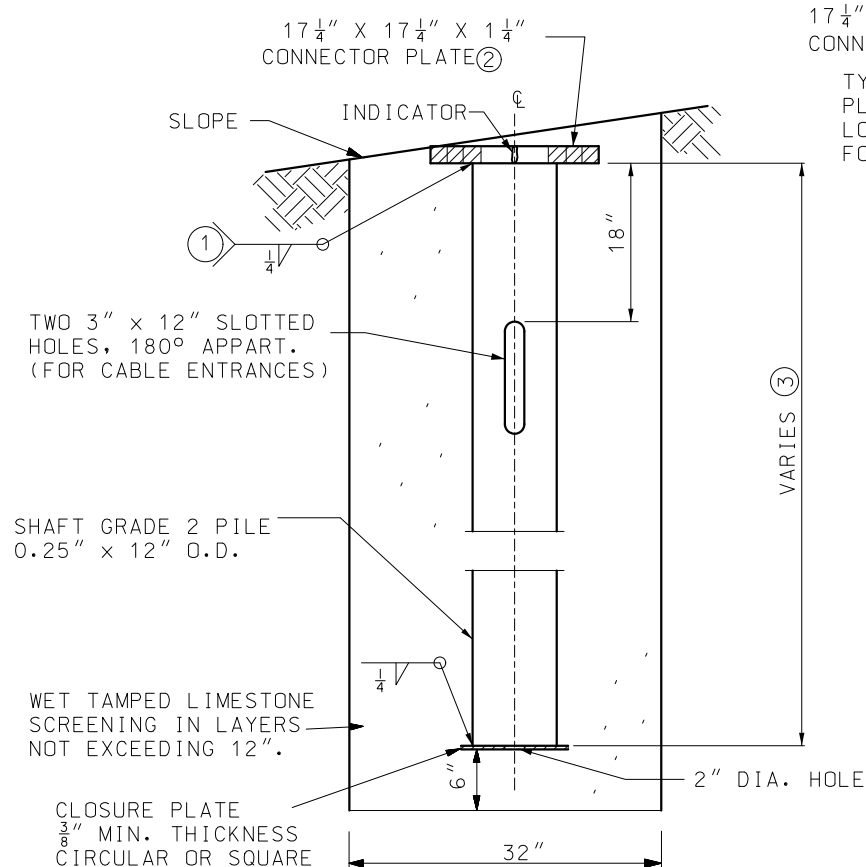


PLAN

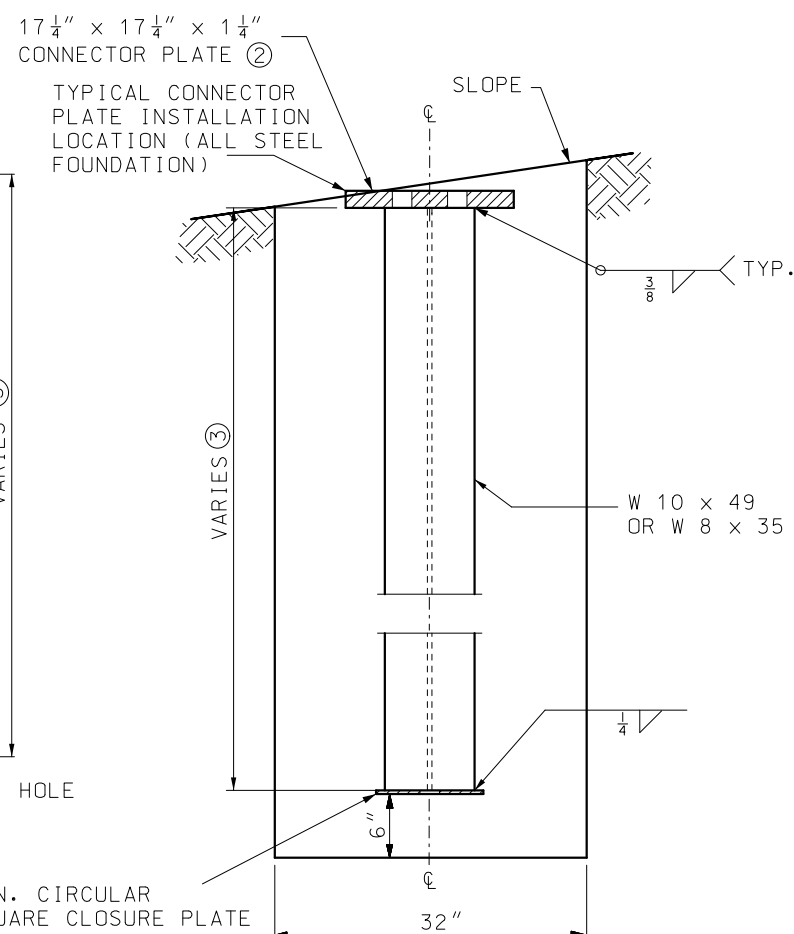


PLAN

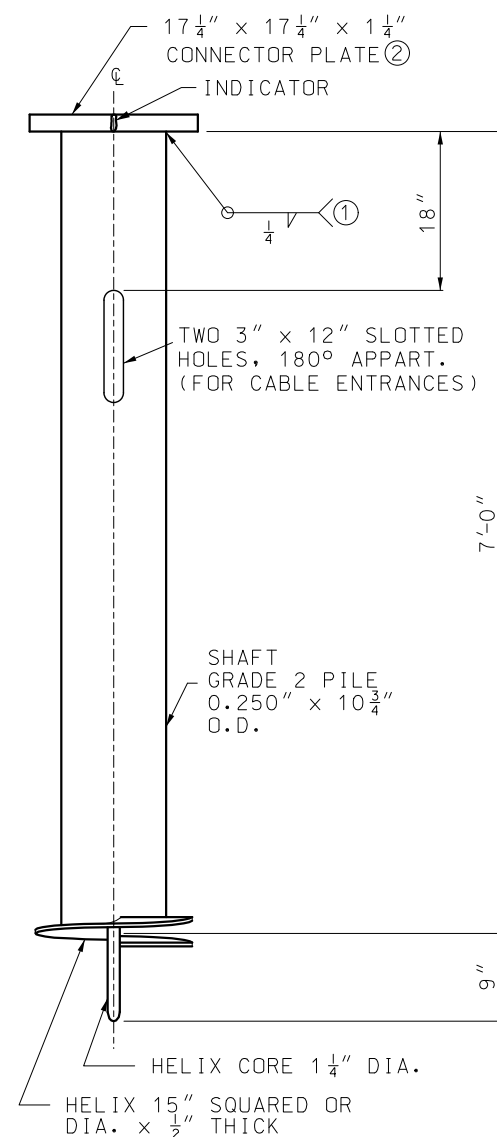
NOTE:  
DRIVE HOLES WILL BE PERMITTED PROVIDED THEY DO NOT CONFLICT WITH OR COMPROMISE THE STRUCTURAL INTEGRITY OF THE PLATE, THE WELD BETWEEN THE PLATE AND SHAFT, OR THE BOLT HOLES.



ELEVATION  
DETAILS OF CIRCULAR  
STEEL PILE FOUNDATION



ELEVATION  
DETAILS OF STEEL "H"  
PILE FOUNDATION



ELEVATION  
DETAILS OF  
SCREW ANCHOR FOUNDATION

- ① GRIND WELD AS NECESSARY TO CLEAR BOLT HEAD.
- ② FOUNDATIONS SHALL BE INSTALLED SO THAT CONNECTOR PLATES ARE LEVEL PERPENDICULAR TO THE BRACKET ARM AND SLOPED FOR POLE RAKING PARALLEL TO THE BRACKET ARM.
- ③ PILE LENGTHS FOR STEEL PILE FOUNDATIONS:

| AT-45<br>DESIGN NO. | PILE LENGTH |
|---------------------|-------------|
| 4 & 5               | 8'-0"       |
| 2 & 3               | 9'-0"       |
| 1                   | 10'-0"      |

GENERAL NOTES:

ALL CLASSIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED. SEE STANDARD SPECIFICATIONS FOR CLASSIFICATIONS NOT SHOWN.

ALL BOLT CIRCLES FOR 45' MOUNTING HEIGHT SHALL BE 17 1/4".

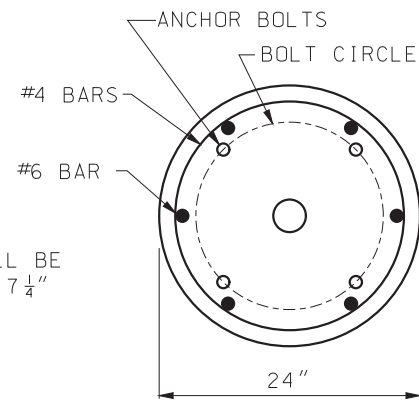
ALL CONECTOR PLATE AND CLOSURE PLATE THICKNESSES SHOWN ARE MINIMUM DIMENSIONS.

ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED 1 1/4" DIAMETER HIGH STRENGTH ANCHOR BOLTS.

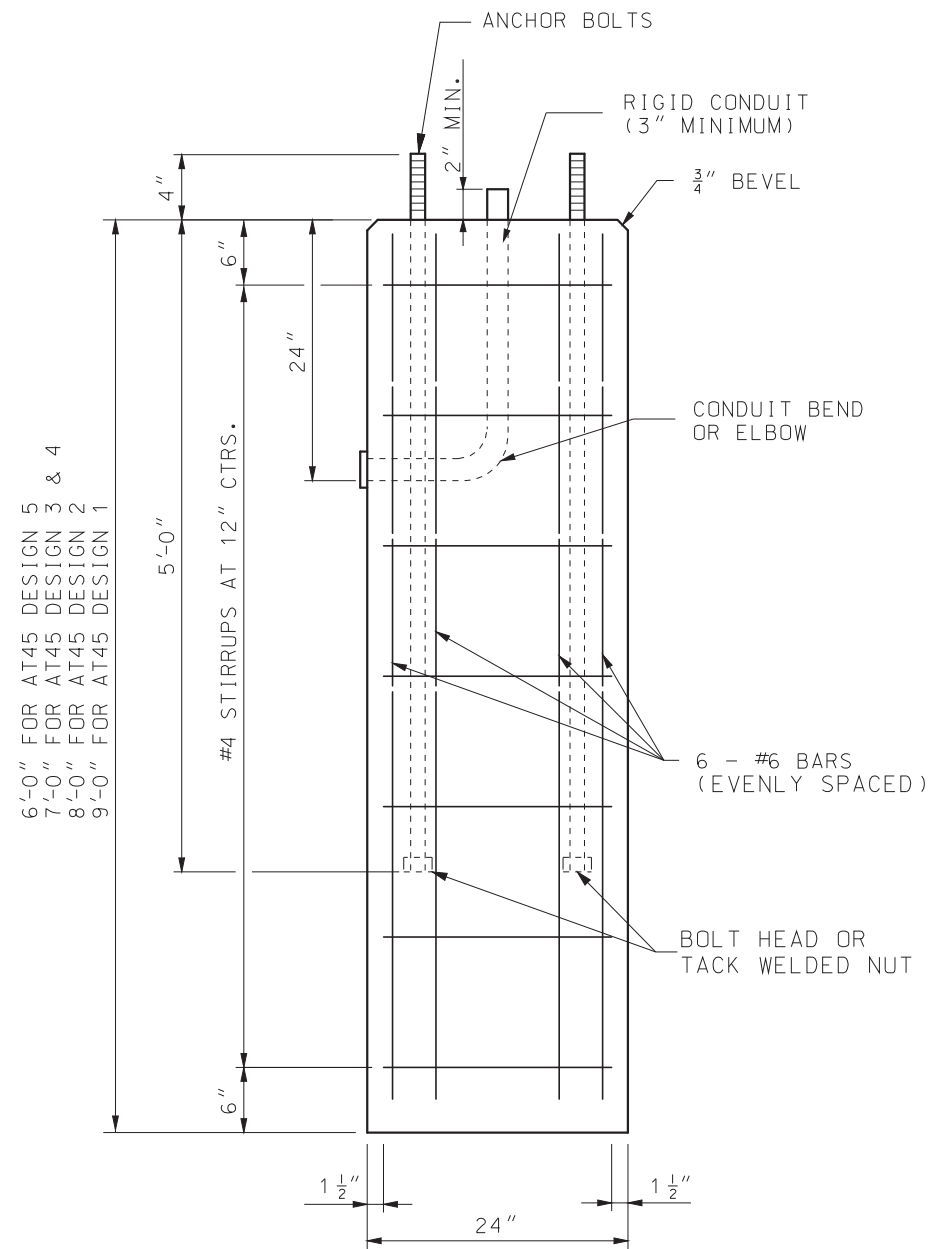
ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED.

|                                                                                                                                                                                                                                                                           |                                                                                                  |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                          |                                                                                                  |                 |
|  <p>STATE OF MISSOURI<br/>NICOLE A. KOLB HOOD<br/>NUMBER<br/>PE-2001018754<br/>PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <b>HIGHWAY LIGHTING<br/>POLES, FOUNDATIONS<br/>AND APPURTENANCES<br/>FOR 45' MOUNTING HEIGHT</b> |                 |
|                                                                                                                                                                                                                                                                           | DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                                          | <b>901.01AJ</b> |

NOTE:  
ANCHOR BOLTS SHALL BE  
PLACED ONLY FOR 17 1/4"  
BOLT CIRCLE



PLAN

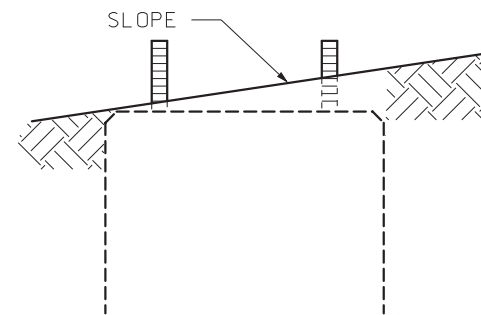


ELEVATION

DETAILS OF CONCRETE  
FOUNDATION ④

- ④ AT THE OPTION OF THE CONTRACTOR THE CONCRETE FOUNDATIONS MAY BE PRECAST. IF PRECAST, THEY SHALL BE SET IN DRILLED HOLES 3 FEET IN DIAMETER AND 6 INCHES DEEPER THAN THE BOTTOM OF THE CONCRETE FOUNDATION. THE BOTTOM 6 INCHES OF THE HOLE AND THE REMAINING SPACE AROUND THE FOUNDATION SHALL BE BACKFILLED WITH WET TAMPED LIMESTONE SCREENINGS IN LAYERS NOT EXCEEDING 12 INCHES.

| QUANTITIES |         |        |
|------------|---------|--------|
|            | CONC.   | REINF. |
| HEIGHT     | CU. YD. | LBS.   |
| 6'-0"      | .70     | 80     |
| 7'-0"      | .81     | 90     |
| 8'-0"      | .93     | 104    |
| 9'-0"      | 1.05    | 120    |



CONCRETE FOUNDATION  
EMBEDMENT

GENERAL NOTES:

ALL CLASSIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED. SEE STANDARD SPECIFICATIONS FOR CLASSIFICATIONS NOT SHOWN.

ALL BOLT CIRCLES FOR 45' MOUNTING HEIGHT SHALL BE 17 1/4".

ALL CONECTOR PLATE AND CLOSURE PLATE THICKNESSES SHOWN ARE MINIMUM DIMENSIONS.

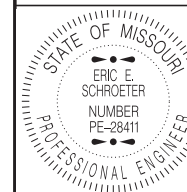
ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED 1 1/4" DIAMETER HIGH STRENGTH ANCHOR BOLTS.

ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED.



MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



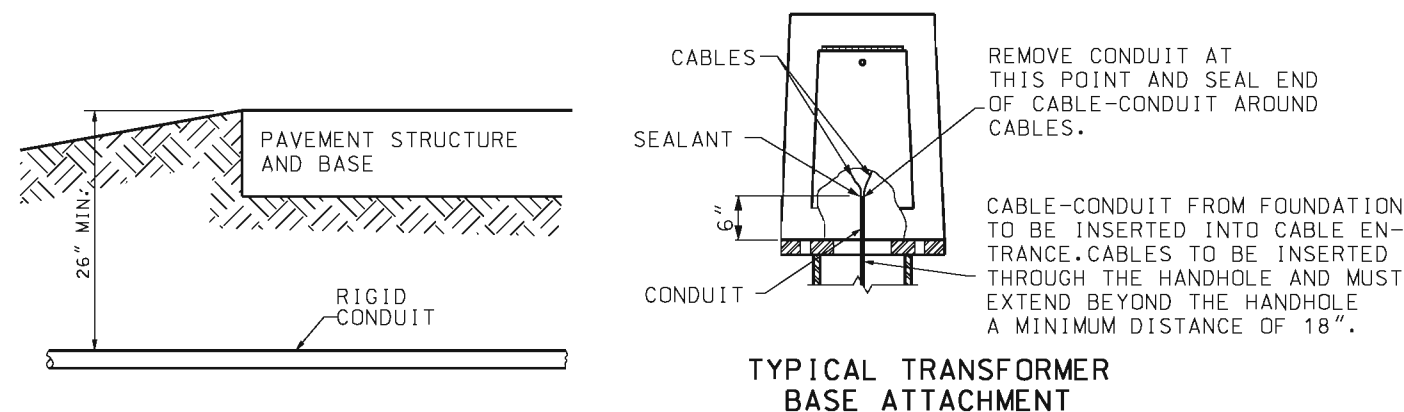
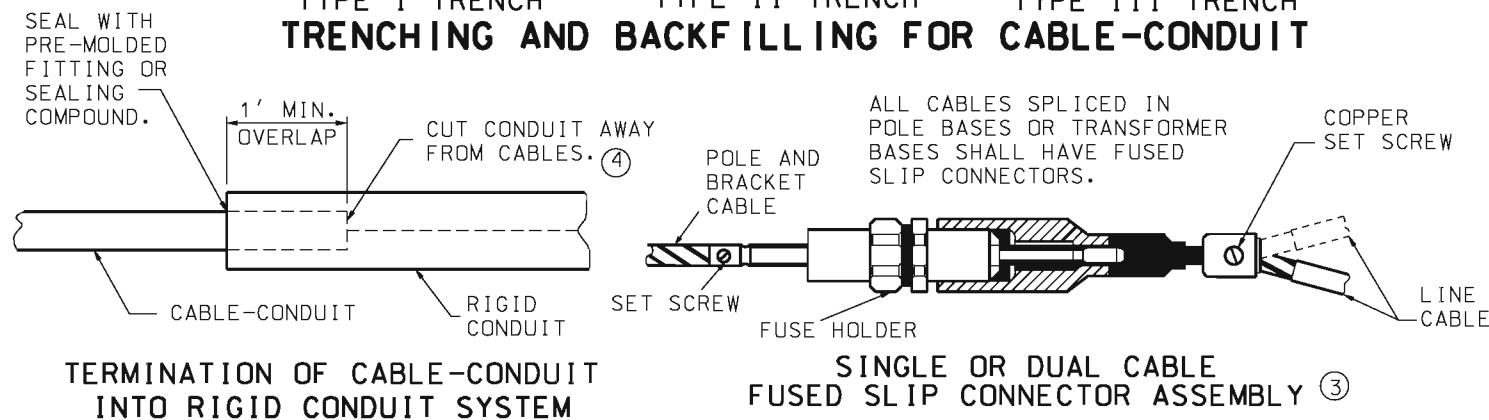
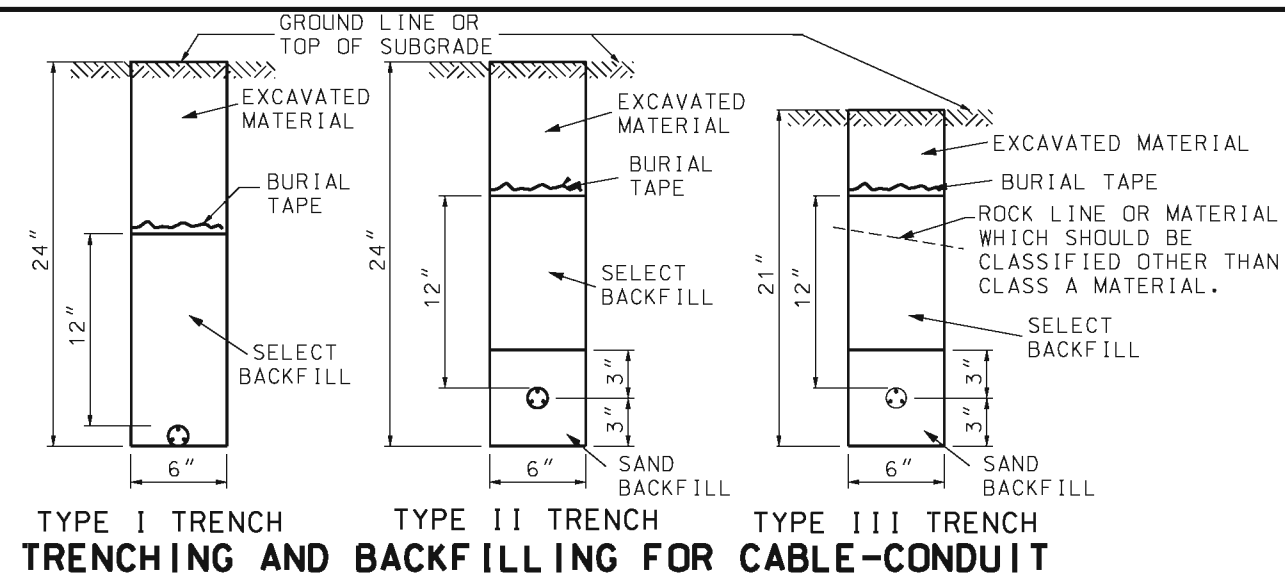
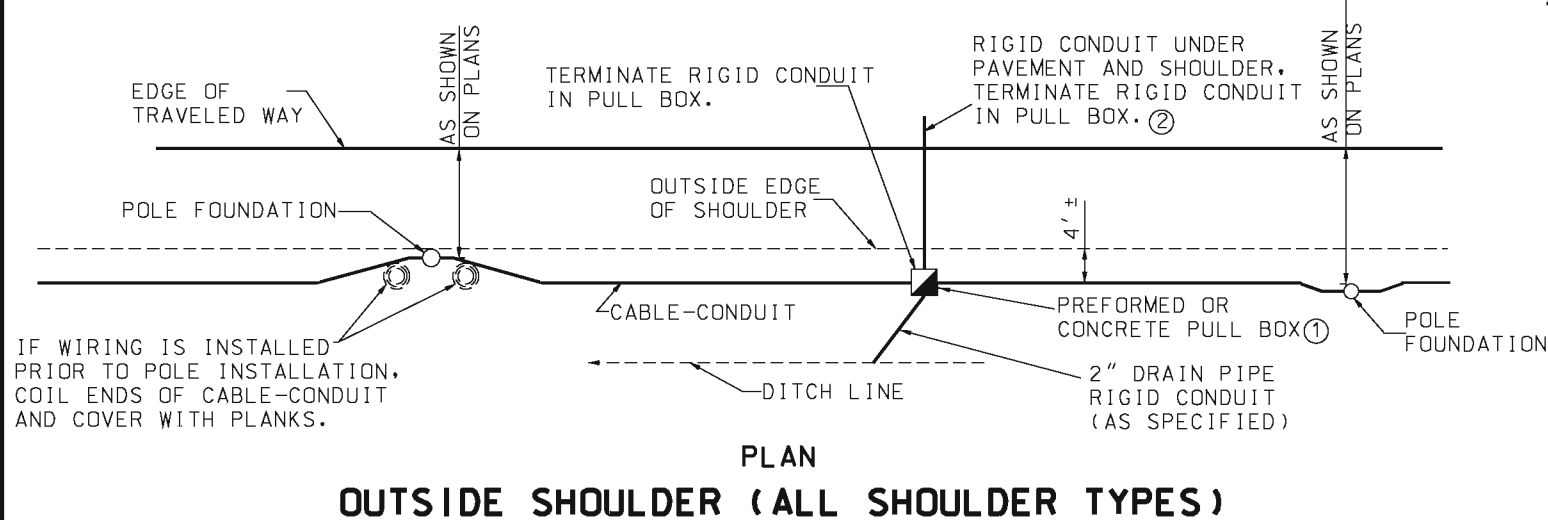
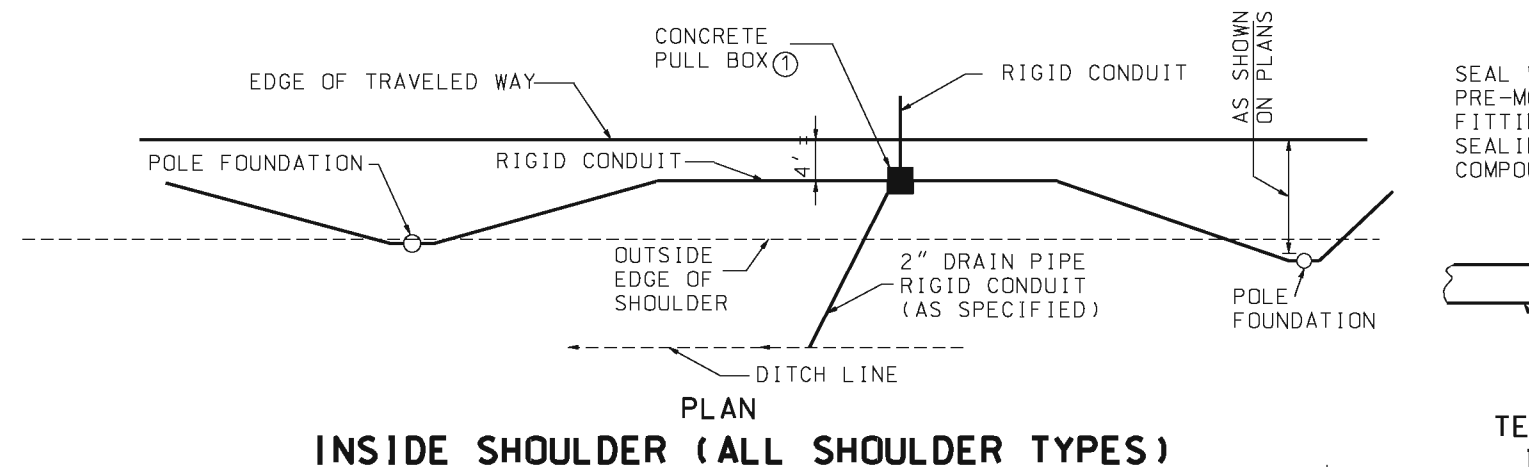
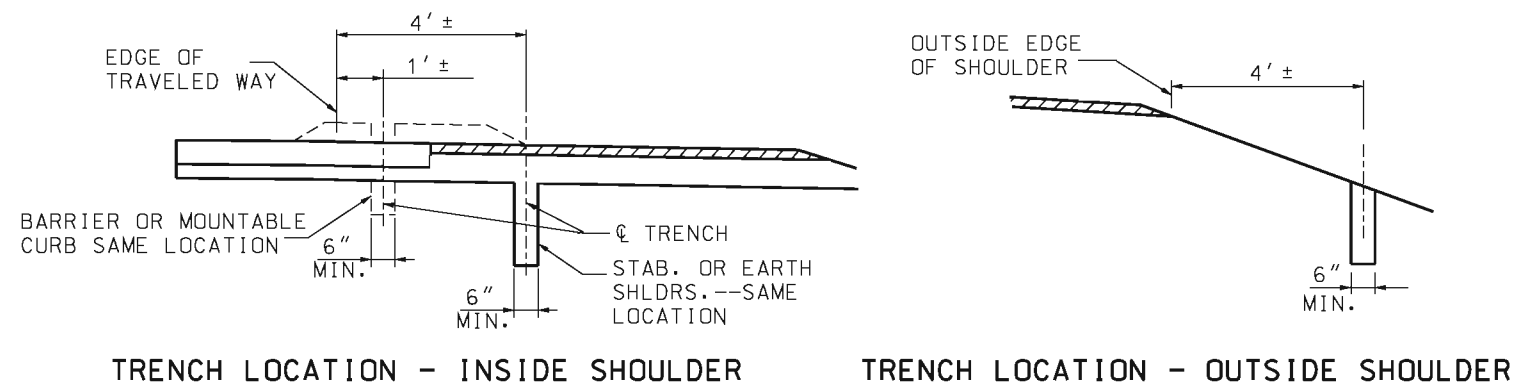
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

HIGHWAY LIGHTING  
POLES, FOUNDATIONS  
AND APPURTENANCES  
FOR 45' MOUNTING HEIGHT

DATE EFFECTIVE: 12/01/2013  
DATE PREPARED: 2/9/2018

901.01AJ

SHEET NO.  
6 OF 6



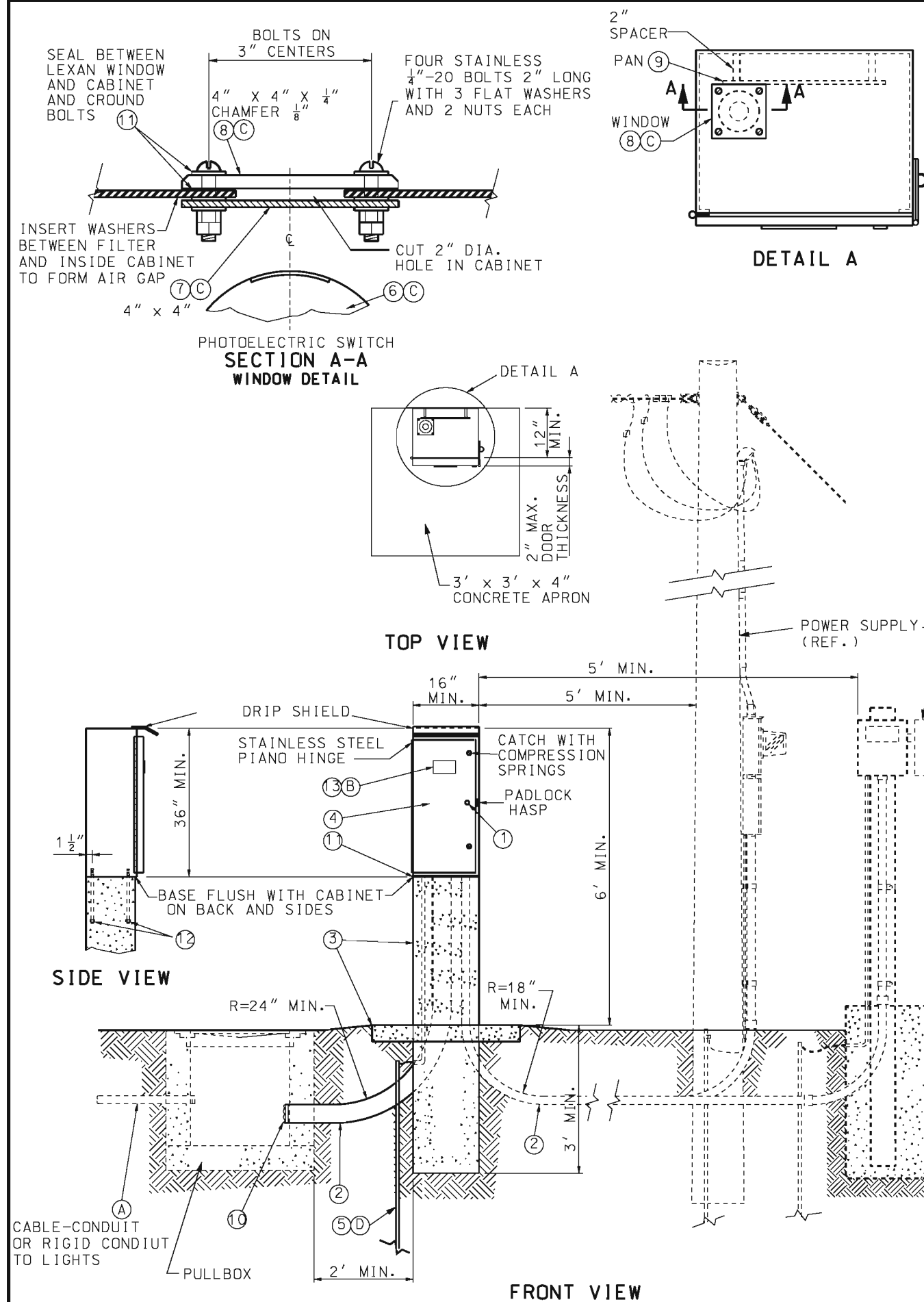
- NOTES:
- ① SEE DRAWING 902.20 FOR PULL BOXES.
  - ② CONDUIT MAY BE REMOVED FROM CABLES IN RIGID CONDUIT. SPLICES SHALL NOT BE MADE UNLESS SHOWN ON PLANS.
  - ③ BRAND AND MODEL OF FUSE HOLDER SHALL BE APPROVED BY THE ENGINEER.
  - ④ CABLES SHALL BE CONTINUOUS TO THE FIRST LIGHT POLE. SPLICES SHALL NOT BE MADE FOR THE PURPOSE OF TERMINATING CABLE-CONDUIT.

GENERAL NOTES:

THE CONDUIT OF THE CABLE-CONDUIT SHALL BE CUT AWAY FROM THE CABLES WHERE THEY ENTER THE RIGID CONDUIT INSIDE A CONCRETE BARRIER OR STRUCTURE.

|                                                                                                                                                         |                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                     |
|                                                                                                                                                         | <p><b>HIGHWAY LIGHTING<br/>CABLE, CONDUIT<br/>AND TRENCHING</b></p> |
| <p>DATE EFFECTIVE: 04/01/2002<br/>DATE PREPARED: 3/10/2011</p>                                                                                          | <p><b>901.02B</b></p>                                               |
| <p>SHEET NO.<br/>1 OF 1</p>                                                                                                                             |                                                                     |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| LIST OF MATERIALS |                                                                                                                         |
|-------------------|-------------------------------------------------------------------------------------------------------------------------|
| ITEM              | DESCRIPTION                                                                                                             |
| 1                 | #2 CORBIN LOCK                                                                                                          |
| 2                 | RIGID CONDUIT *                                                                                                         |
| 3                 | CLASS B CONCRETE, 0.4 C.Y. ±                                                                                            |
| 4                 | NEMA 4, DUST-TIGHT, WATERTIGHT, CABINET                                                                                 |
| 5                 | GROUND ROD, $\frac{3}{4}$ " DIA. X 8' MIN.                                                                              |
| 6                 | PHOTOELECTRIC SWITCH AND SOCKET, 105/285 V., 1000-WATT                                                                  |
| 7                 | TRANSLUCENT, PLEXIGLASS FILTER #W2067, $\frac{1}{8}$ " THICK                                                            |
| 8                 | CLEAR, LEXAN #9034 WINDOW, $\frac{1}{4}$ " THICK MIN.                                                                   |
| 9                 | MOUNTING PAN, $31\frac{1}{2}$ " x 12" x $\frac{1}{4}$ " ALUMINUM OR STAINLESS STEEL                                     |
| 10                | PLIABLE DUCT SEALANT                                                                                                    |
| 11                | LIFETIME SILICONE CAULK                                                                                                 |
| 12                | ANCHOR BOLTS, 5/8-11 x 14" LONG BOLTS, HOT DIP GALVANIZED, 4 REQUIRED, USE BOLT HEAD OR TACK WELDED NUT ON EMBEDDED END |
| 13                | WEATHERPROOF ADHESIVE LABEL, VINYL RAISED LETTERING (OR EQUIVALENT, SEE DETAIL)                                         |
|                   | * - SEE PLANS                                                                                                           |

NOTES

- (A) IF CABLE-CONDUIT IS SPECIFIED, THE CONDUIT SHALL BE CUT AWAY FROM CABINET BETWEEN PULL BOX AND CONTROL STATION.
- (B) LIGHTING SYSTEM VOLTAGE AS SPECIFIED ON PLANS.
- (C) PHOTOELECTRIC SWITCH BRACKETS MAY VARY. LOCATE CENTER OF WINDOW OVER CENTER OF PHOTOELECTRIC SWITCH.
- (D) IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CADWELDED.

GENERAL NOTES:

ALTERNATE CABINET DIMENSIONS WILL BE ALLOWED AS APPROVED BY THE ENGINEER. INTERIOR CABINET VOLUME SHALL BE EQUAL TO OR GREATER THAN THAT SHOWN ON PLANS AND PROPER CLEARANCES SHALL BE PROVIDED FOR ALL EQUIPMENT. CONCRETE BASE DIMENSIONS SHALL BE MODIFIED TO FIT THE CABINET SUPPLIER.

PLACEMENT OF ALL ITEMS SHALL BE APPROVED BY THE ENGINEER.

CABINET SHALL BE LOCATED AWAY FROM TRAFFIC. TOP  
MOUNT PHOTO CONTROL SHALL FACE AN OPEN SKY. SIDE  
MOUNT PHOTO CONTROL SHALL FACE NORTH.

SEE PLANS FOR CIRCUIT WIRING; MAXIMUM LOADING PER CIRCUIT IS 7,400 WATTS FOR 240 VOLT AND 11,000 WATTS FOR 480 VOLT.

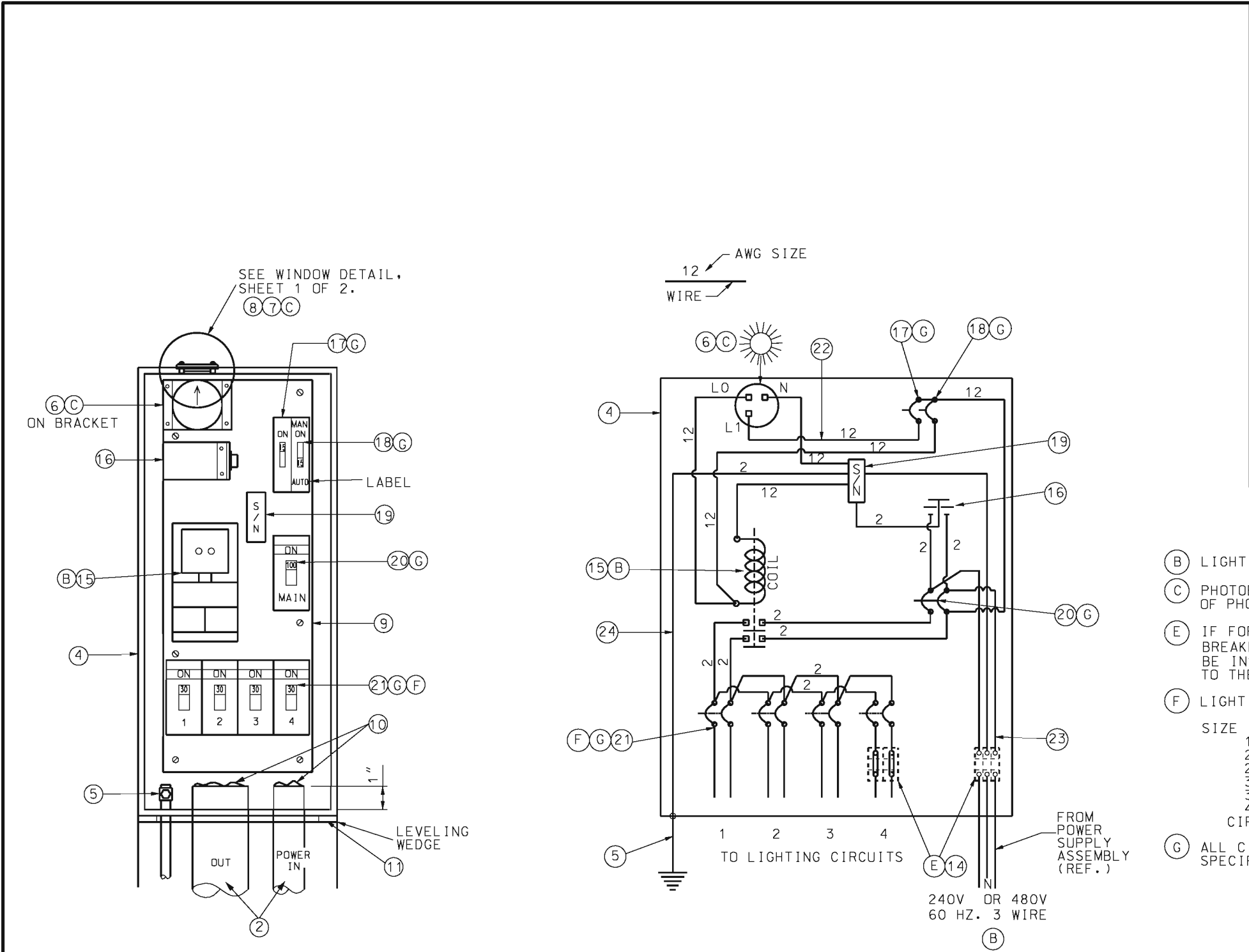
SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF  
CABINET DOOR.

THE UTILITY SHALL BE NOTIFIED IN WRITING 30 DAYS  
PRIOR TO DATE SERVICE WILL BE REQUIRED.

ALL OPENINGS IN CABINET SHALL BE COVERED AND SEALED  
WITH LIFETIME SILICONE CAULK.

ALL MATERIALS REQUIRED EXCLUDING REFERENCE ITEMS AS SHOWN ON DRAWING SHALL BE INCLUDED IN PRICE BID FOR CONTROL STATION.

|                                                                                                       |                                                                                                                                                                                          |                                                          |
|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
|                  | <h1 style="margin: 0;">MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</h1> <p style="margin: 0;">105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65101<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                          |
|                  | <h2 style="margin: 0;">HIGHWAY LIGHTING</h2> <h3 style="margin: 0;">BASE MOUNTED</h3> <h3 style="margin: 0;">CONTROL STATION</h3> <h2 style="margin: 0;">240 V OR 480 V - 4 CIRCUIT</h2> |                                                          |
| <p style="font-size: small;">THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> |                                                                                                                                                                                          |                                                          |
| <p>DATE EFFECTIVE: <u>04/01/2005</u></p> <p>DATE PREPARED: <u>9/14/2010</u></p>                       | <h1 style="margin: 0;">901.30F</h1>                                                                                                                                                      | <p>SHEET NO.</p> <p style="font-size: large;">1 OF 2</p> |



EQUIPMENT LAYOUT

WIRING DIAGRAM

| LIST OF MATERIALS |                                                                |
|-------------------|----------------------------------------------------------------|
| ITEM              | DESCRIPTION                                                    |
| 2                 | RIGID CONDUIT *                                                |
| 4                 | NEMA 4, DUST-TIGHT, WATERTIGHT CABINET                         |
| 5                 | GROUND ROD, 3/4" DIA. X 8' MIN.                                |
| 6                 | PHOTOELECTRIC SWITCH AND SOCKET, 105/285 V., 1000 WATT         |
| 7                 | TRANSLUCENT, PLEXIGLASS FILTER #W2067, 1/8" THICK              |
| 8                 | CLEAR, LEXAN #9034 WINDOW, 1/4" THICK MIN.                     |
| 9                 | MOUNTING PAN, 31 1/2" X 12" X 1/4" ALUMINUM OR STAINLESS STEEL |
| 10                | PLIABLE SEALANT                                                |
| 11                | LIFETIME SILICONE CAULK                                        |
| 14                | INSULATED TERMINAL BLOCK, FOR GREATER THAN 4/0 CABLE           |
| 15(240V)          | 2-POLE, 100 AMP, 120V COIL LIGHTING CONTACTOR                  |
| 15(480V)          | 2-POLE, 100 AMP, 240V COIL LIGHTING CONTACTOR                  |
| 16                | 2-POLE, 650 VOLT LIGHTING ARRESTER                             |
| 17                | 1-POLE, 15 AMP, TYPE B CONTROL BREAKER                         |
| 18                | 1-POLE, 15 AMP, TYPE B MANUAL-AUTO SWITCH                      |
| 19                | INSULATED GROUNDABLE NEUTRAL, 100 AMP                          |
| 20                | 2-POLE, 100 AMP, TYPE A MAIN BREAKER                           |
| 21                | 2-POLE, 15 AMP(MIN), TYPE A LIGHTING BREAKERS                  |
| 22                | #12 AWG MIN., 600 V. CONTROL CABLE                             |
| 23                | #2 AWG MIN., 600 V. * POWER CABLE                              |
| 24                | #2 AWG MIN., 600 V. GROUND CABLE                               |
| *                 | SEE PLANS                                                      |

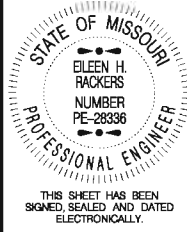
NOTES

- (B) LIGHTING SYSTEM VOLTAGE AS SPECIFIED ON PLANS.
- (C) PHOTOELECTRIC SWITCH BRACKETS MAY VARY. LOCATE CENTER OF WINDOW OVER CENTER OF PHOTOELECTRIC SWITCH.
- (E) IF FOR REASONS OF VOLTAGE DROP A WIRE SIZE IS SPECIFIED LARGER THAN THE BREAKER LUGS CAN ACCOMMODATE, AN INSULATED HEAVY DUTY TERMINAL BLOCK SHALL BE INSTALLED TO TERMINATE THE LARGER WIRES AND A SMALLER JUMPER CONNECTED TO THE BREAKER ITSELF.
- (F) LIGHTING BREAKER SIZING:
- | SIZE (AMPS) | 240V TOTAL<br>CIRCUIT LOAD (WATTS) | 480V TOTAL<br>CIRCUIT LOAD (WATTS) |
|-------------|------------------------------------|------------------------------------|
| 15          | 0-2800                             | 0 - 5500                           |
| 20          | 2850-3700                          | 5550 - 7400                        |
| 25          | 3750-4600                          | 7450 - 9200                        |
| 30          | 4650-5500                          | 9250 - 11,000                      |
| 35          | 5550-6500                          | --                                 |
| 40          | 6550-7400                          | --                                 |
- CIRCUIT LOAD INCLUDES LOAD DUE TO LINE LOSS, LAMP, AND BALLAST LOAD.
- (G) ALL CIRCUIT BREAKERS SHALL CONFORM TO SECTION 901.4 OF THE STANDARD SPECIFICATIONS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**HIGHWAY LIGHTING  
BASE MOUNTED  
CONTROL STATION  
240 V OR 480 V - 4 CIRCUIT**

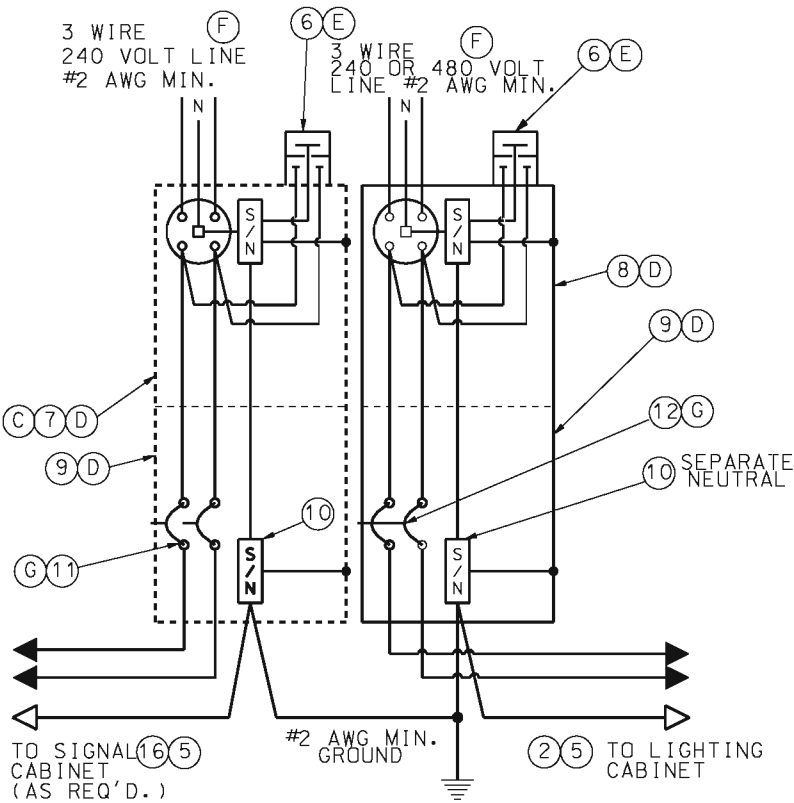
DATE EFFECTIVE: 04/01/2005  
DATE PREPARED: 8/26/2009

**901.30F**

SHEET NO.  
2 OF 2



| LIST OF MATERIALS |                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------|
| ITEM              | DESCRIPTION                                                                                |
| 1                 | SERVICE POLE 30' MIN., CLASS 4 WOOD, CONTRACTOR PROVIDED, MoDOT OWNED*                     |
| 2                 | #2 AWG MIN. CABLE, 600 VOLT *                                                              |
| 3                 | SERVICE ENTRANCE HEAD                                                                      |
| 4                 | GUY CABLE, AS REQUIRED                                                                     |
| 5                 | RIGID CONDUIT, 2" MIN., WITH PREFORMED ELBOWS                                              |
| 6                 | LIGHTNING ARRESTER, VALVE TYPE, 2 POLE, 650 VOLT                                           |
| 7                 | METER SOCKET, 200 AMP, FOR SIGNALS                                                         |
| 8                 | METER SOCKET, 200 AMP, FOR LIGHTING                                                        |
| 9                 | LOCKING, RAIN TIGHT, NEMA 4 SERVICE DISCONNECT BOX                                         |
| 10                | INSULATED, GROUNDABLE NEUTRAL WIRE, 200 AMP MINIMUM                                        |
| 11                | SIGNAL BREAKERS, SINGLE POLE, 40A MIN, TYPE A OR B *                                       |
| 12                | LIGHTING BREAKER, 2 POLE, 240 VOLT, 100A, TYPE A OR B                                      |
| 13                | 1/2" METAL CONDUIT                                                                         |
| 14                | #2 AWG MIN. GROUND WIRE                                                                    |
| 15                | GROUND ROD, 3/4" x 8' MIN.                                                                 |
| 16                | #8 AWG MIN. CABLE, 600 VOLT *                                                              |
| 17                | CLASS B CONCRETE, 0.92 C.Y. ±                                                              |
| 18                | THREADED CONDUIT HUB WITH SEALING WASHERS                                                  |
| 19                | WEATHERPROOF ADHESIVE LABEL (LIGHTING), VINYL RAISED LETTERING (OR EQUIVALENT, SEE DETAIL) |
| 20                | WEATHERPROOF ADHESIVE LABEL (SIGNALS), VINYL RAISED LETTERING (OR EQUIVALENT, SEE DETAIL)  |
| 21                | W6 x 9 OR W6 x 15 GALVANIZED POST                                                          |
| 22                | #2 AWG MIN. CABLE, 600 VOLT                                                                |
| 23                | RIGID CONDUIT, 2" MINIMUM                                                                  |
| *                 | SEE PLANS                                                                                  |



WIRING DIAGRAM  
LIGHTING AND/OR SIGNALS

NOTES:

- (A) SERVICE POLE SHALL BE GUYED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50 FEET.
- (B) INCREASE 1 FOOT FOR EACH 5 FEET ABOVE 30 FEET.
- (C) SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAINLESS STEEL. METER SOCKET FOR SIGNALS OR LIGHTING AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED, AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.
- (D) SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF CABINET DOOR.
- (E) UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET. IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE DISCONNECT CABINET.
- (F) LIGHTING SYSTEM VOLTAGE OF 240 VOLTS OR 480 VOLTS AS SHOWN ON THE PLANS.
- (G) BREAKERS SHALL CONFORM TO SEC. 901.4 OF THE STANDARD SPECIFICATIONS.
- (H) IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CADWELDED.

GENERAL NOTES:

FOR CABLE TYPES AND INSTALLATION, SEE STANDARD SPECIFICATIONS.

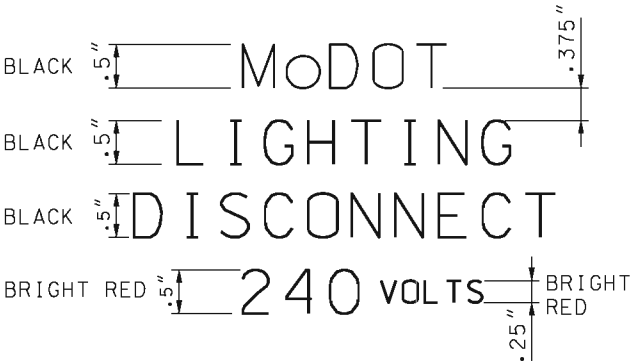
THE POWER SUPPLY ASSEMBLY TYPE IS SHOWN ON THE PLANS OR IS DESIGNATED IN THE CONTRACT.

THE UTILITY COMPANY SHALL BE NOTIFIED IN WRITING 30 DAYS PRIOR TO DATE SERVICE WILL BE REQUIRED.

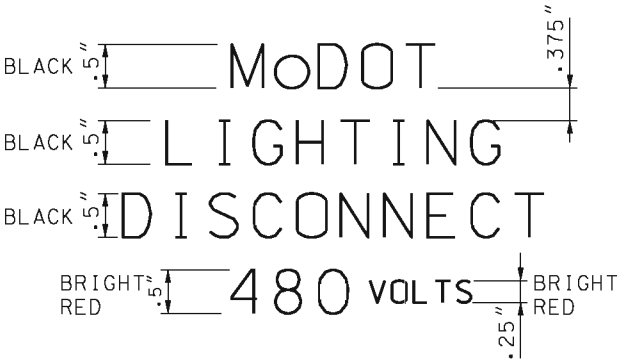
WHERE SIGNAL OR LIGHTING POWER ONLY IS DESIGNATED, OMIT ITEMS NOT REQUIRED.

ALL OPENINGS IN ANY SERVICE BOX OR METER BOX SHALL BE COVERED AND SEALED WITH LIFETIME SILICONE CAULK.

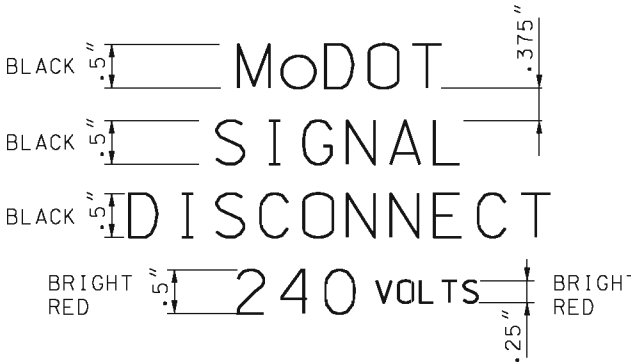
ALL MATERIALS REQUIRED AS SHOWN ON DRAWING, INCLUDING CABLE AND CONDUIT FROM POWER SUPPLY ASSEMBLY TO UTILITY COMPANY FACILITIES, SHALL BE INCLUDED IN UNIT BID PRICE FOR POWER SUPPLY ASSEMBLY.



LABEL DETAIL (19) (240 VOLT) (F)



LABEL DETAIL (19) (480 VOLT) (F)



LABEL DETAIL (20)

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

HIGHWAY LIGHTING  
POWER SUPPLY ASSEMBLY  
SECONDARY SERVICE

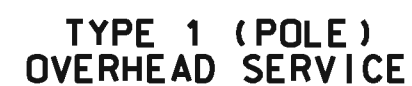
DATE EFFECTIVE: 04/01/2002  
DATE PREPARED: 4/1/2010

901.80D

SHEET NO.  
1 OF 2

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

ALL SERVICE POWER SUPPLY ASSEMBLIES  
ARE TO BE LOCATED ON STATE PROPERTY.



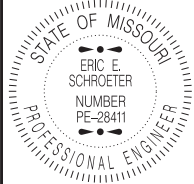
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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
|                                                                              |                                                                                                                                        | <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                            |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <h1 style="text-align: center;">HIGHWAY LIGHTING</h1> <h2 style="text-align: center;">POWER SUPPLY ASSEMBLY<br/>SECONDARY SERVICE</h2> |                                                                                                                                                |                            |
| <b>DATE EFFECTIVE:</b> 04/01/2002<br><b>DATE PREPARED:</b> 5/19/2010                                                                                              | <h1 style="font-size: 2em;">901.80D</h1>                                                                                               |                                                                                                                                                | <b>SHEET NO.</b><br>2 OF 2 |

|  |                                             |
|--|---------------------------------------------|
|  | LED-C LUMINAIRE                             |
|  | BRACKET ARM                                 |
|  | BOLT DOWN LIGHT STANDARD                    |
|  | EXISTING LIGHT STANDARD AND LUMINAIRE       |
|  | LED-A LUMINAIRE                             |
|  | LED-B LUMINAIRE                             |
|  | 150 WATT UNDERPASS LUMINAIRE                |
|  | HIGH MAST TOWER WITH LUMINAIRE ARM          |
|  | PULL BOX, TYPE I DRAIN, CONCRETE            |
|  | PULL BOX, TYPE II DRAIN, CONCRETE           |
|  | PULL BOX, TYPE I DRAIN, PREFORMED           |
|  | PULL BOX, TYPE II DRAIN, PREFORMED          |
|  | EXISTING PULL BOX, TYPE I DRAIN, CONCRETE   |
|  | EXISTING PULL BOX, TYPE II DRAIN, CONCRETE  |
|  | EXISTING PULL BOX, TYPE I DRAIN, PREFORMED  |
|  | EXISTING PULL BOX, TYPE II DRAIN, PREFORMED |

|  |                                                                                                |
|--|------------------------------------------------------------------------------------------------|
|  | SERVICE POLE OR PEDESTAL AND POWER SUPPLY                                                      |
|  | TRANSFORMER OR SUBSTATION POLE                                                                 |
|  | BASE MOUNTED LIGHTING CONTROL STATION WITH PAD                                                 |
|  | EXISTING BASE MOUNTED CONTROL STATION                                                          |
|  | GROUND CONNECTION                                                                              |
|  | RIGID CONDUIT IN TRENCH                                                                        |
|  | CAPPED RIGID CONDUIT                                                                           |
|  | RIGID CONDUIT PUSHED                                                                           |
|  | EXISTING RIGID CONDUIT                                                                         |
|  | RIGID CONDUIT ON BRIDGE                                                                        |
|  | RIGID CONDUIT IN MEDIAN                                                                        |
|  | CABLE CONDUIT WITH CIRCUIT NUMBER                                                              |
|  | EXISTING CABLE CONDUIT                                                                         |
|  | EXPOSED CONDUIT ON UNDER SIDE OF BRIDGES. NUMBER OF HATCHES DENOTES NUMBER OF WIRES IN CONDUIT |



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

## HIGHWAY LIGHTING SYMBOLS

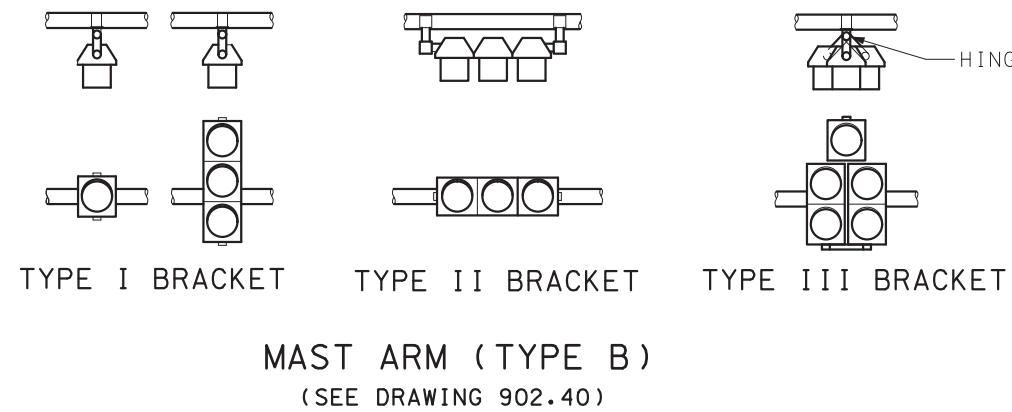
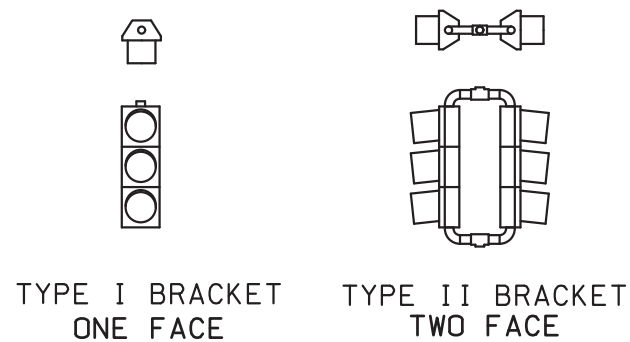
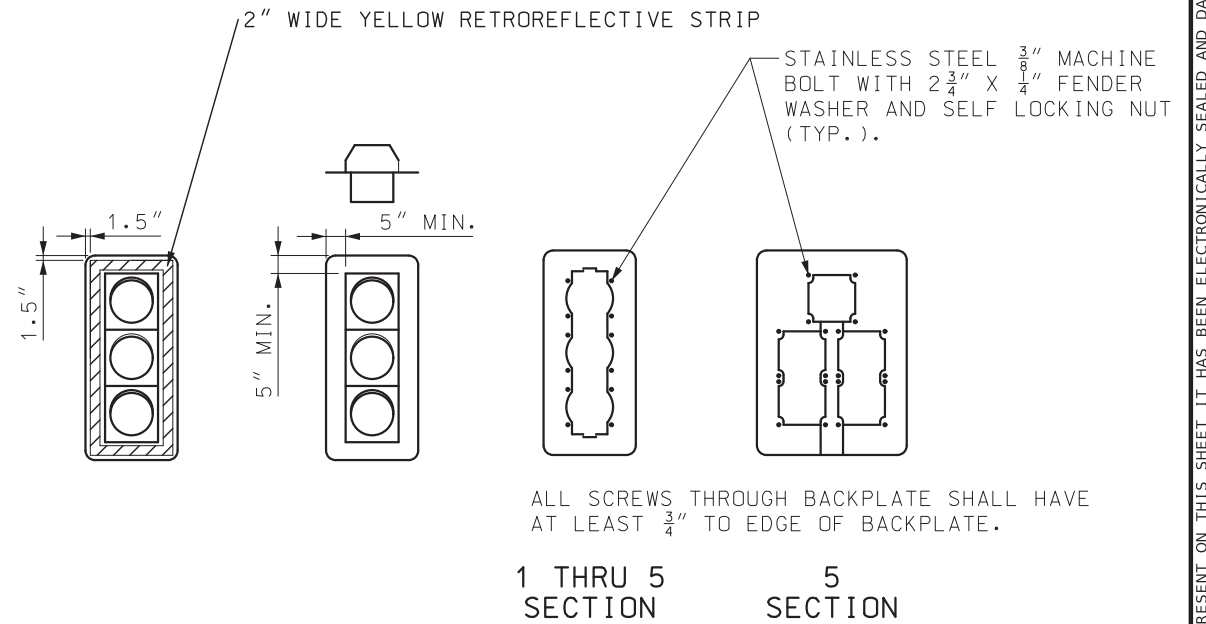
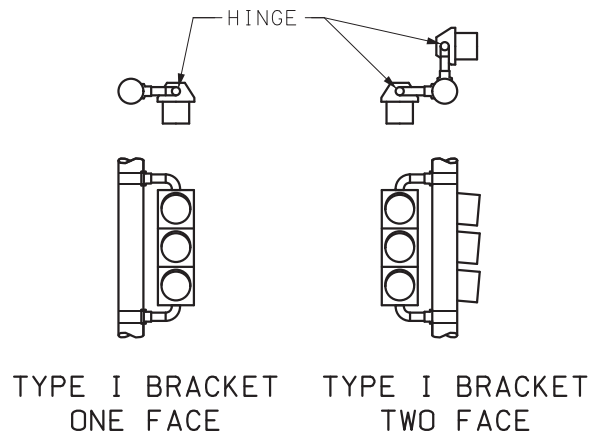
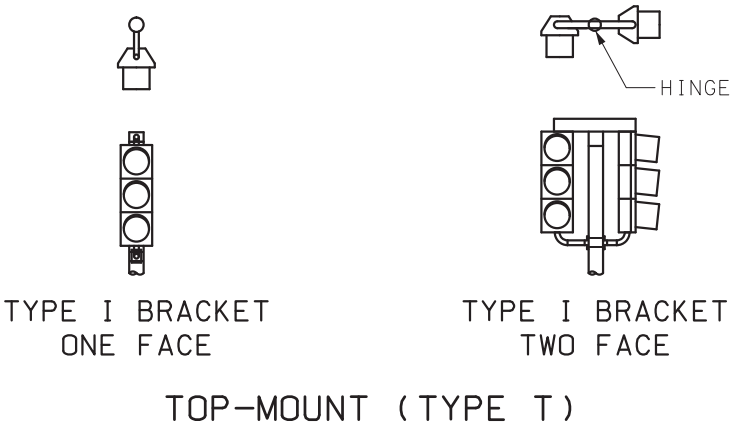
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|----------------------------|---------|---------------------|
| DATE EFFECTIVE: 04/01/2018 | 901.85B | SHEET NO.<br>1 OF 1 |
| DATE PREPARED: 2/9/2018    |         |                     |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



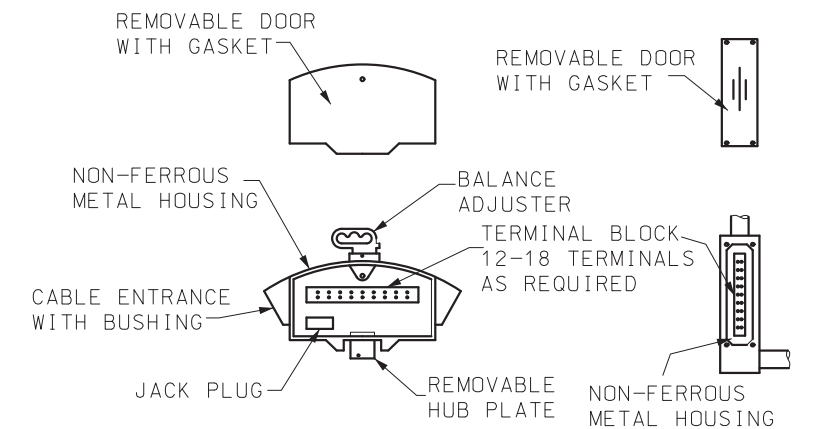
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
|                                                                                                                                                                                                                                            |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                     |
|  <p>STATE OF MISSOURI<br/>         NICOLE A. KOLB HOOD<br/>         NUMBER<br/>         PE-2001018754<br/>         PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>         SIGNED, SEALED AND DATED<br/>         ELECTRONICALLY.</p> |  | <p><b>TRAFFIC SIGNALS</b><br/> <b>SIGNAL HEAD MOUNTING</b></p>                                                                             |                     |
| DATE EFFECTIVE: <u>7/1/2023</u><br>DATE PREPARED: <u>4/4/2023</u>                                                                                                                                                                                                                                                               |  | 902.00Q                                                                                                                                    | SHEET NO.<br>1 OF 2 |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

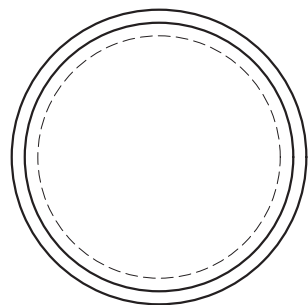


TUNNEL

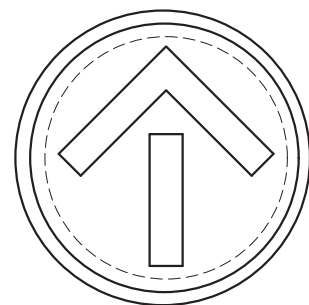
VISORS



TERMINAL COMPARTMENT



CIRCULAR



ARROW

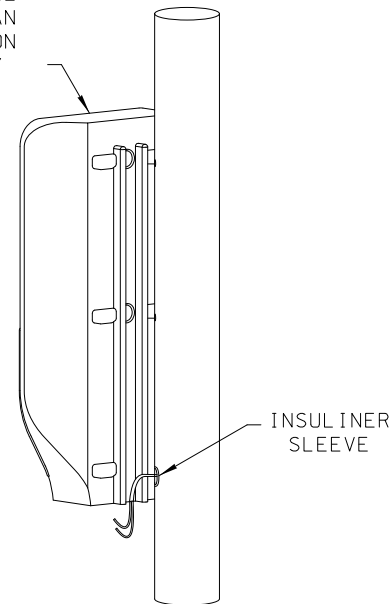


PEDESTRIAN

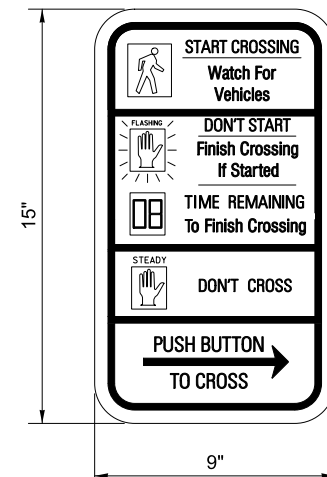
INDICATIONS

|                                                                                                                                                                                                                                  |                                                                                                  |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                  |         |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>                                                                        | <b>TRAFFIC SIGNALS</b><br>SIGNAL HEAD LOUVERS,<br>VISORS, BACKPLATES AND<br>TERMINAL COMPARTMENT |         |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 7/1/2023<br>DATE PREPARED: 4/4/2023                                              | 902.00Q |

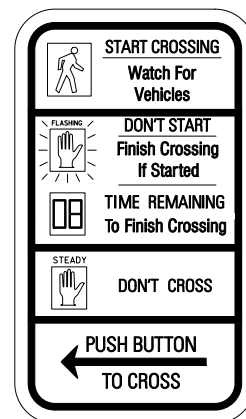
ACCESSIBLE  
PEDESTRIAN  
PUSHBUTTON  
ASSEMBLY



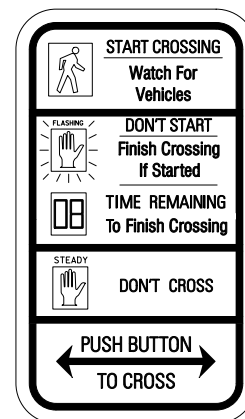
WIRE ROUTING  
PERSPECTIVE VIEW



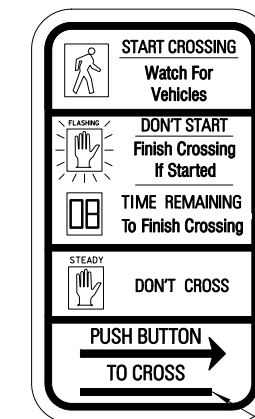
R10-3e (RIGHT)



R10-3e (LEFT)

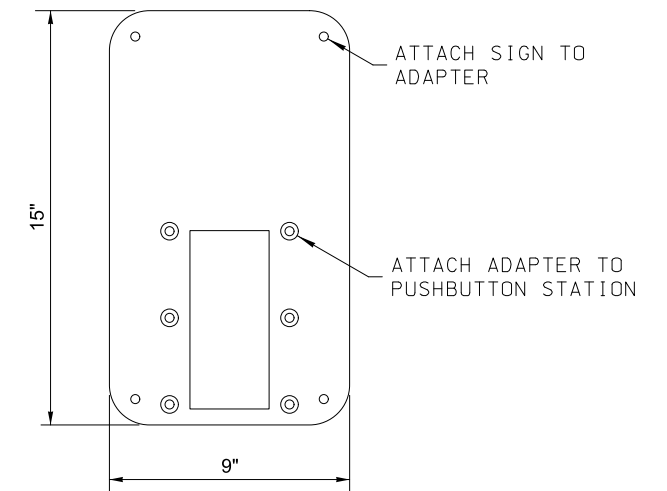


R10-3e (MOD.)



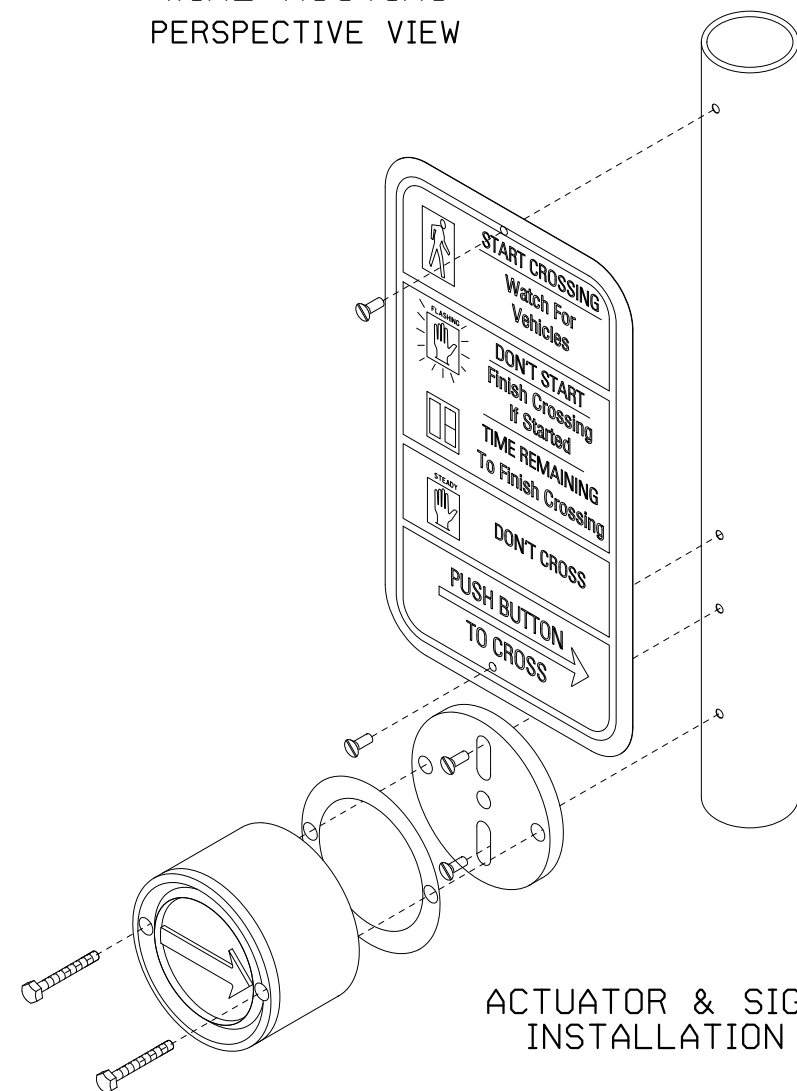
R10-3e (WITH BRAILLE)  
OPTIONAL (APPROVED BY  
DISTRICT)

BRAILLE:  
"STREET NAME"

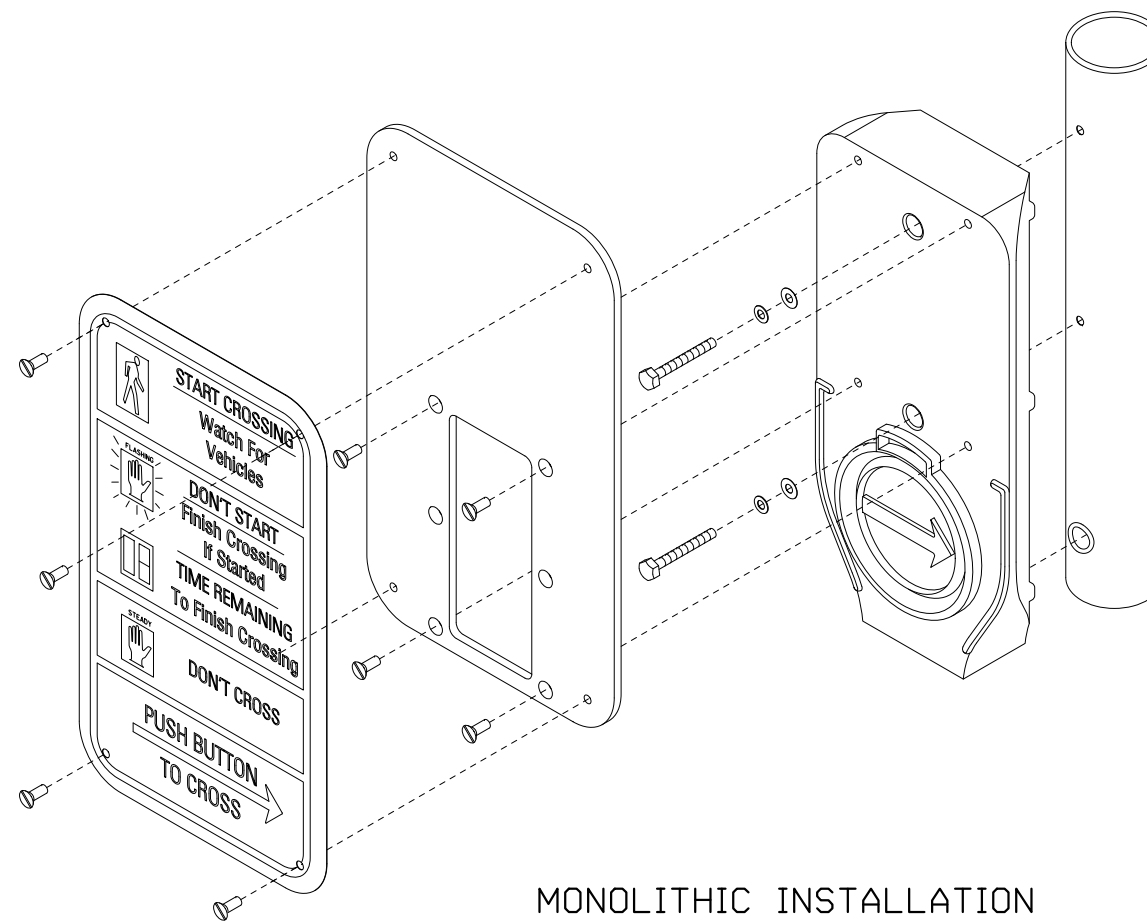


PEDESTRIAN PUSHBUTTON  
FRAME ADAPTER

PEDESTRIAN PUSHBUTTON  
INSTRUCTIONAL SIGN



ACTUATOR & SIGN  
INSTALLATION



MONOLITHIC INSTALLATION

ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY

GENERAL NOTES:

ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY MAY BE MONOLITHIC OR A SEPARATE ACTUATOR AND SIGN.

SIGNS FOR SIGNAL INSTALLATIONS, INCLUDING ALL MATERIAL REQUIRED FOR SIGN MOUNTING, SHALL BE FURNISHED BY THE CONTRACTOR. SIGNS SHALL BE MANUFACTURED IN ACCORDANCE WITH SEC 903, AND MOUNTED AS SHOWN ON THE PLANS.

ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY CAN BE MOUNTED TO SIGNAL POLE, PEDESTRIAN POLE, OR PEDESTRIAN PUSHBUTTON POLE.

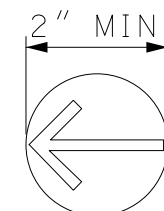
INCLUDE A 9" X 15" R10-3E SIGN WITH EACH ASSEMBLY.

REQUIRES POLE ADAPTER WHEN MOUNTING TWO UNITS ON THE SAME PEDESTRIAN POLE. ADDITIONAL MOUNTING EXTENSION BRACKETS SHALL BE PROVIDED IF A 10" MAXIMUM REACH FROM AN ACCESSIBLE SIDEWALK CANNOT BE ACHIEVED.

IF THE CURB RAMP IS NOT ALIGNED WITH THE CROSSWALK, THE ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY SHALL POINT IN THE DIRECTION OF TRAVEL, NOT IN THE DIRECTION OF THE CURB RAMP ORIENTATION.

|                                                                                                                                                                                                                                                                                  |                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b>                                                                                                                                 |                                                            |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                                                                                                                                                 |                                                            |
|  <b>STATE OF MISSOURI</b><br>NICOLE A. KOLB HOOD<br>NUMBER<br>PE-2001018754<br>PROFESSIONAL ENGINEER<br><small>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</small> | <b>TRAFFIC SIGNALS</b><br>ACCESSIBLE PEDESTRIAN<br>SIGNALS |
| DATE EFFECTIVE: 04/01/2021<br>DATE PREPARED: 2/17/2021                                                                                                                                                                                                                           | <b>902.05</b>                                              |
| SHEET NO.<br>1 OF 2                                                                                                                                                                                                                                                              |                                                            |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



### ACTUATOR DETAIL

#### GENERAL NOTES:

ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY MAY BE MONOLITHIC OR A SEPARATE ACTUATOR AND SIGN.

THE ACCESSIBLE PEDESTRIAN SIGNAL PUSHBUTTON SHALL BE OF THE PRESSURE-ACTIVATED TYPE WITH ESSENTIALLY NO MOVING PARTS. IT SHALL BE "ADA" COMPLIANT AND WEATHERPROOF.

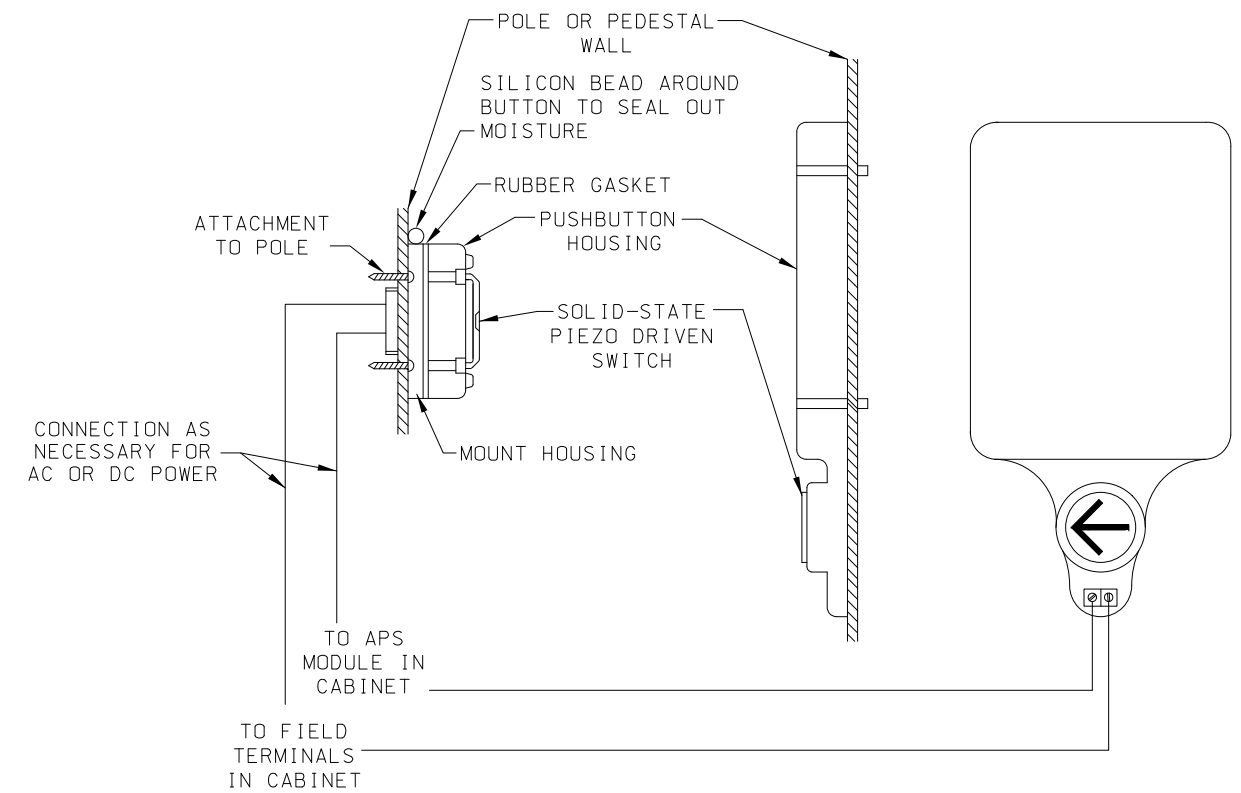
THE HOUSING SHALL BE BLACK, FIT THE CURVATURE OF THE POST TO WHICH IT IS ATTACHED AND SHALL PROVIDE A RIGID INSTALLATION. ACCESSIBLE PEDESTRIAN SIGNAL CAN BE MOUNTED TO THE SIGNAL POLE, PEDESTRIAN POLE, OR PEDESTRIAN PEDESTAL POLE.

THERE SHALL BE A TACTILE ARROW POINTING IN THE DIRECTION OF PEDESTRIAN TRAVEL CONTROLLED BY THE BUTTON.

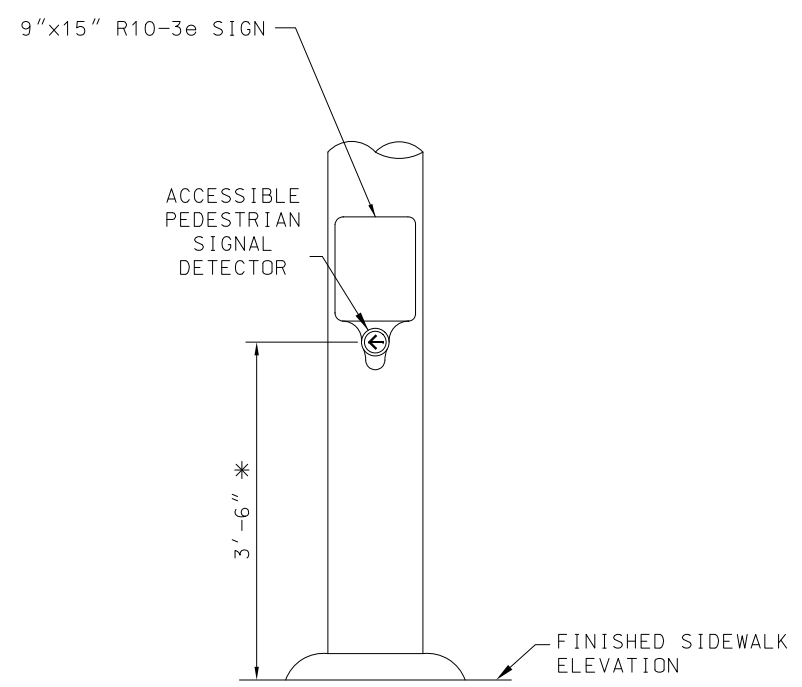
THE ACTUATOR SHALL BE A MINIMUM OF 2 INCHES IN DIAMETER, RAISED, CONTRAST VISUALLY WITH THE HOUSING AND MADE OF BRASS OR CORROSION-RESISTANT METAL ALLOY OR NON-METALLIC MATERIAL. A MAXIMUM FORCE OF 3.5 LBS SHALL BE REQUIRED TO ACTIVATE THE SWITCH. SWITCH SHALL BE OF THE SOLID-STATE ELECTRONIC, PIEZO TYPE.

THE ACCESSIBLE PEDESTRIAN SIGNAL SHALL OPERATE AT A VOLTAGE NO GREATER THAN 24 VOLTS. SOME MANUFACTURERS PROVIDE A 2-WIRE ACCESSIBLE PEDESTRIAN SIGNAL SYSTEM THAT USES THE EXISTING WIRING FROM PREVIOUSLY INSTALLED STANDARD PUSHBUTTONS. SOME MANUFACTURERS PROVIDE 3-WIRE AND 4-WIRE SYSTEMS. A 4-WIRE SYSTEM SHOULD BE SET UP JUST LIKE THE 3-WIRE SYSTEM, BUT IN THE 4-WIRE SYSTEM, AN EXTRA GROUND WIRE RUNS FROM THE PEDESTRIAN HEAD TO THE PUSHBUTTON. BOTH ARE ACCEPTABLE OPTIONS. THERE ARE SOME SYSTEMS THAT PROVIDE WIRELESS CONNECTIVITY FOR BLUETOOTH PROGRAMMING.

THE ACCESSIBLE PEDESTRIAN SIGNAL SHALL BE FULLY OPERATIONAL BETWEEN -30°F TO +165°F (-34°C TO +74°C), SHALL NOT ALLOW ICE TO FORM SUCH TO IMPEDE THE OPERATION OF THE BUTTON, AND SHALL HAVE A WEATHERPROOF SPEAKER.

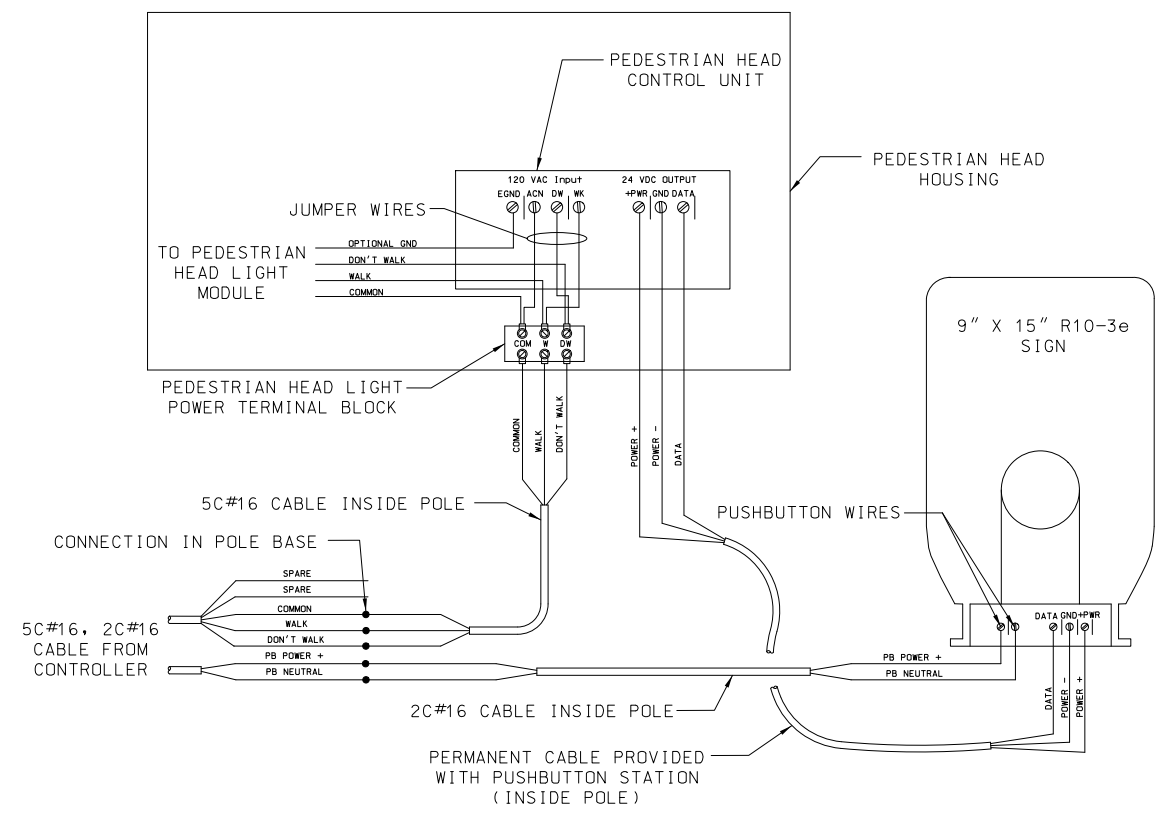


### 2-WIRE SYSTEM WIRING DETAILS



\* PUSHBUTTON SHOULD BE MOUNTED AS CLOSE TO 3'-6" WITHOUT GOING OVER TO SATISFY THE LIMITATIONS AND GUIDANCE OF THE MUTCD.

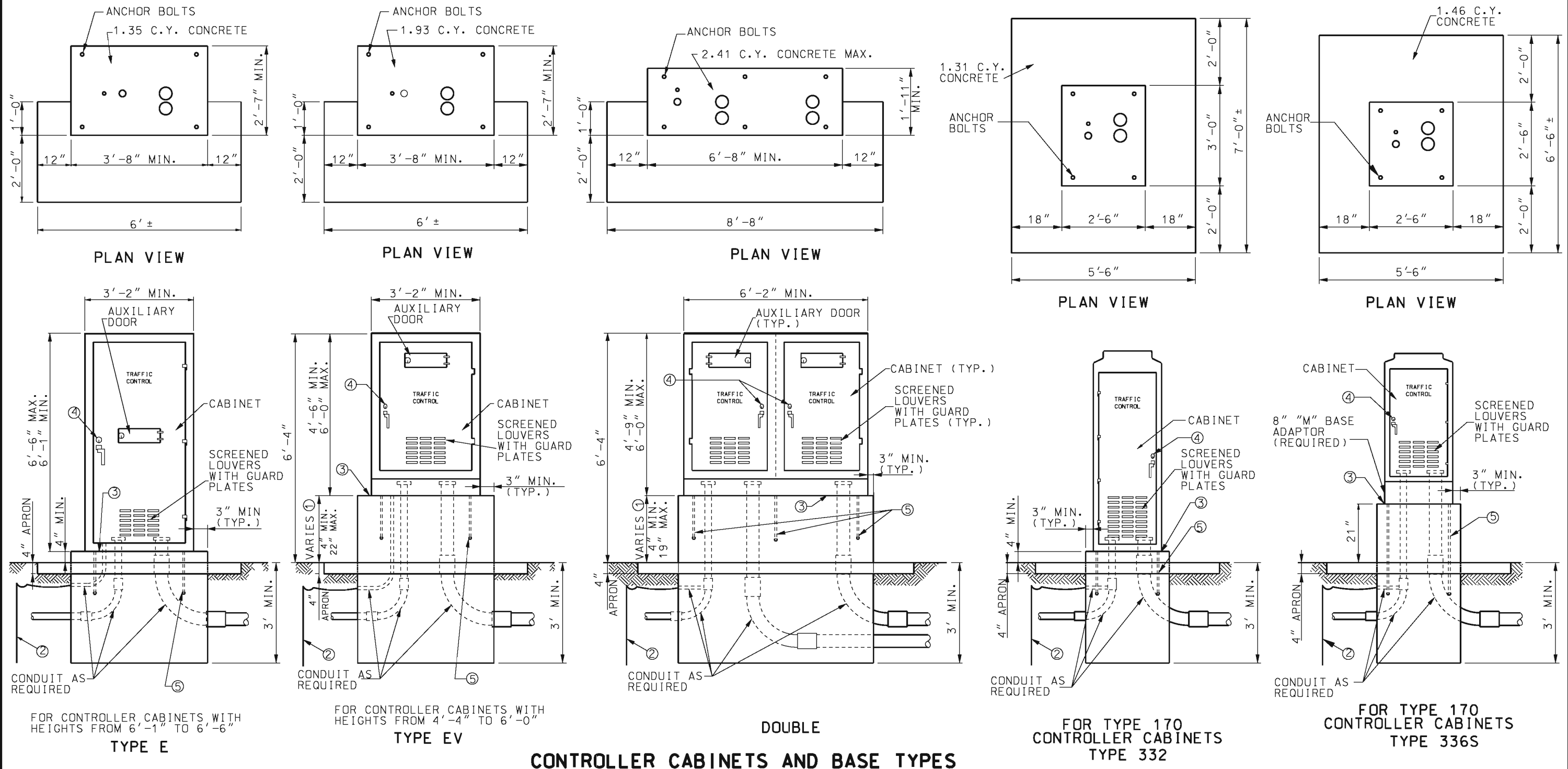
### ACCESSIBLE PEDESTRIAN SIGNAL ASSEMBLY



### 3-WIRE SYSTEM WIRING DETAILS

|                                                                                                                                                           |                                                                |               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>              |                                                                |               |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                          |                                                                |               |
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p> | <b>TRAFFIC SIGNALS</b><br><b>ACCESSIBLE PEDESTRIAN SIGNALS</b> |               |
|                                                                                                                                                           | DATE EFFECTIVE: 04/01/2021<br>DATE PREPARED: 2/17/2021         | <b>902.05</b> |





- NOTES:
- ① DIMENSION VARIES ACCORDING TO CABINET HEIGHT.
  - ② GROUND ROD, 3/4" DIA. x 8' MIN. IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CADWELDED.
  - ③ LIFETIME SILICONE CAULK BETWEEN CABINET AND BASE.
  - ④ #2 CORBIN LOCK
  - ⑤ ANCHOR BOLTS (USE BOLT HEAD OR TACK WELDED NUT ON EMBEDDED END AND SIZE AS SPECIFIED BY CABINET MANUFACTURER).

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

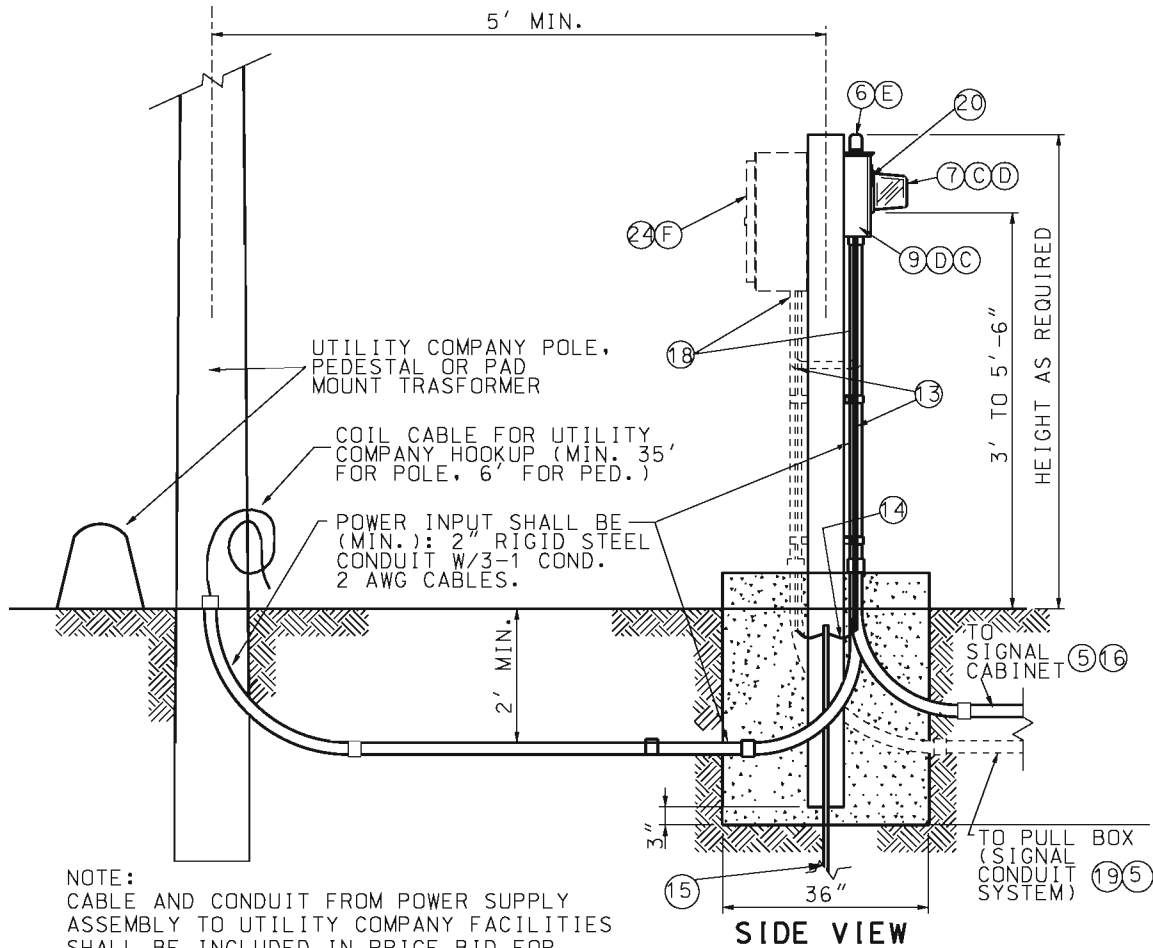
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**TRAFFIC SIGNALS CONTROLLERS CONDUIT LOCATION**

|                 |            |                |                     |
|-----------------|------------|----------------|---------------------|
| DATE EFFECTIVE: | 04/01/2005 | <b>902.100</b> | SHEET NO.<br>1 OF 1 |
| DATE PREPARED:  | 8/26/2009  |                |                     |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

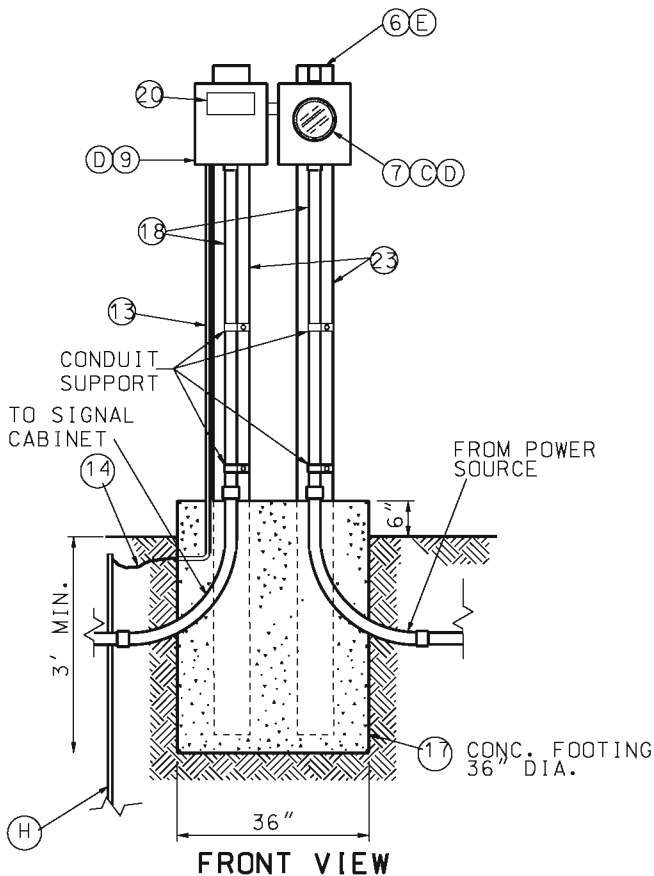
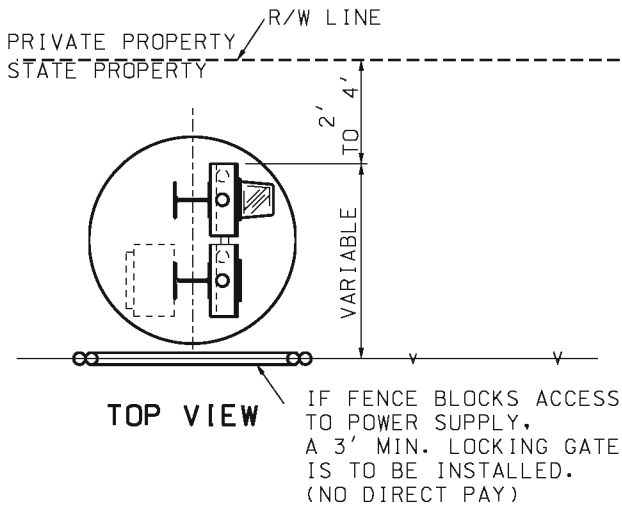
| LIST OF MATERIALS |                                                                          |
|-------------------|--------------------------------------------------------------------------|
| ITEM              | DESCRIPTION                                                              |
| 1                 | SERVICE POLE 30' MIN., CLASS IV WOOD, CONTRACTOR PROVIDED, MoDOT OWNED * |
| 2                 | #8 AWG MIN. CABLE, 600 VOLT *                                            |
| 3                 | SERVICE ENTRANCE HEAD                                                    |
| 4                 | GUY CABLE, AS REQUIRED                                                   |
| 5                 | 2" MIN. RIGID CONDUIT WITH PREFORMED ELBOWS                              |
| 6                 | LIGHTNING ARRESTOR, VALVE TYPE, 2 POLE, 650 VOLT                         |
| 7                 | METER SOCKET, 200 AMP, FOR SIGNALS                                       |
| 8                 | 2" MIN. RIGID CONDUIT                                                    |
| 9                 | SERVICE DISCONNECT BOX, LOCKING, RAIN TIGHT, NEMA 4                      |
| 10                | INSULATED, GROUNDABLE NEUTRAL, 200 AMP MINIMUM                           |
| 11                | SIGNAL BREAKER, SINGLE POLE, 40A MIN, TYPE A OR B *                      |
| 12                | LIGHTING BREAKER, SINGLE POLE, 40A, TYPE A OR B                          |
| 13                | METAL CONDUIT, 1/2"                                                      |
| 14                | GROUND WIRE, #2 AWG MIN.                                                 |
| 15                | GROUND ROD, 3/4" x 8' MIN.                                               |
| 16                | #8 AWG MIN. CABLE, 600 VOLT                                              |
| 17                | CLASS B CONCRETE, 0.92 C.Y. ±                                            |
| 18                | THREADED CONDUIT HUB WITH SEALING WASHERS                                |
| 19                | LIGHTING CABLES *                                                        |
| 20                | WEATHERPROOF ADHESIVE LABEL (SIGNALS) VINYL RAISED LETTERING             |
| 21                | TYPE B CONTROLLER AND SIGNAL BREAKER, AS SPECIFIED.                      |
| 22                | TYPE B AUXILIARY BREAKER, 15 AMP                                         |
| 23                | W6 x 9 OR W6 x 15 GALVANIZED POST                                        |
| 24                | LIGHTING CONTROL CABINET (SEE SHEET 2)                                   |
| 25                | #2 AWG MIN. CABLE, 600 VOLT                                              |
| *                 | SEE PLANS                                                                |



TYPE 2 (PEDESTAL)  
UNDERGROUND SERVICE

PEDESTAL OR NEW STATE-OWNED POLE TO BE SET WITHIN 2' TO 4' OF RIGHT-OF-WAY LINE.

ALL SERVICE POWER SUPPLY ASSEMBLIES ARE TO BE LOCATED ON STATE PROPERTY.



NOTES

- (A) SERVICE POLE SHALL BE GUYED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50'.
- (B) INCREASE 1 FOOT FOR EACH 5 FEET ABOVE 50 FEET.
- (C) SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAIN-LESS STEEL. METER SOCKET AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED, AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.
- (D) SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF DOOR.
- (E) UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET, IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE CONNECT CABINET
- (F) IF LIGHTING IS SPECIFIED, INSTALL LIGHTING CONTROL ON POWER SUPPLY.
- (G) BREAKERS SHALL CONFORM TO SEC. 901.4 OF THE STANDARD SPECIFICATIONS.
- (H) IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CAD WELDED.

GENERAL NOTES:  
FOR CABLE TYPES AND INSTALLATION, SEE STANDARD SPECIFICATIONS.

THE TYPE POWER SUPPLY ASSEMBLY IS SHOWN ON THE PLANS OR IS DESIGNATED IN THE CONTRACT.

THE UTILITY COMPANY SHALL BE NOTIFIED IN WRITING 30 DAYS PRIOR TO DATE SERVICE WILL BE REQUIRED.

WHERE SIGNAL OR LIGHTING POWER ONLY IS DESIGNATED, OMIT ITEMS NOT REQUIRED.

ALL OPENINGS IN ANY SERVICE BOX OR METER BOX SHALL BE COVERED AND SEALED WITH LIFETIME SILICONE CAULK.

ALL MATERIALS REQUIRED EXCLUDING REFERENCE ITEMS AS SHOWN ON DRAWING SHALL BE INCLUDED IN PRICE BID FOR POWER SUPPLY ASSEMBLY.

FOR WIRING DIAGRAM AND LABEL DETAIL SEE SHEET 2 OF 4.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

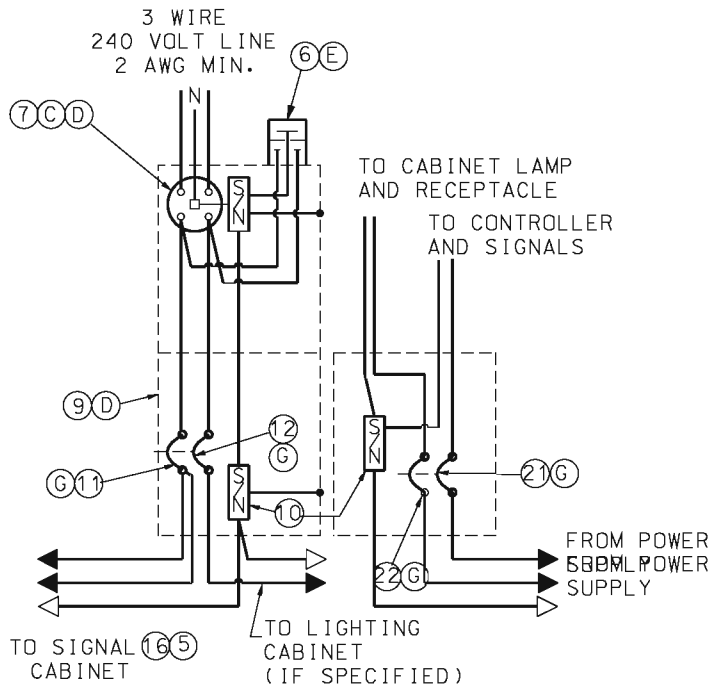
**TRAFFIC SIGNALS  
POWER SUPPLY ASSEMBLY  
240/120 VOLT SERVICE**

DATE EFFECTIVE: 07/01/2004  
DATE PREPARED: 8/26/2009

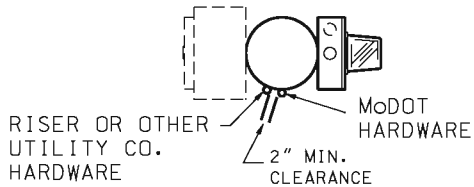
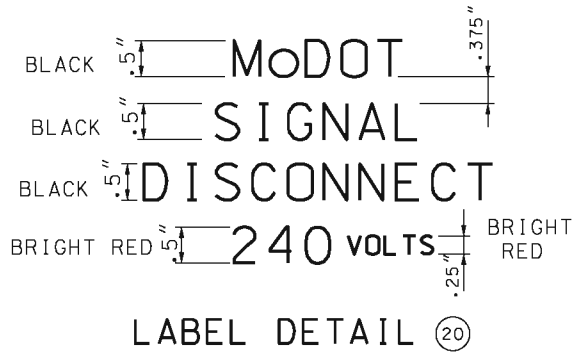
902.15K

SHEET NO.  
1 OF 3

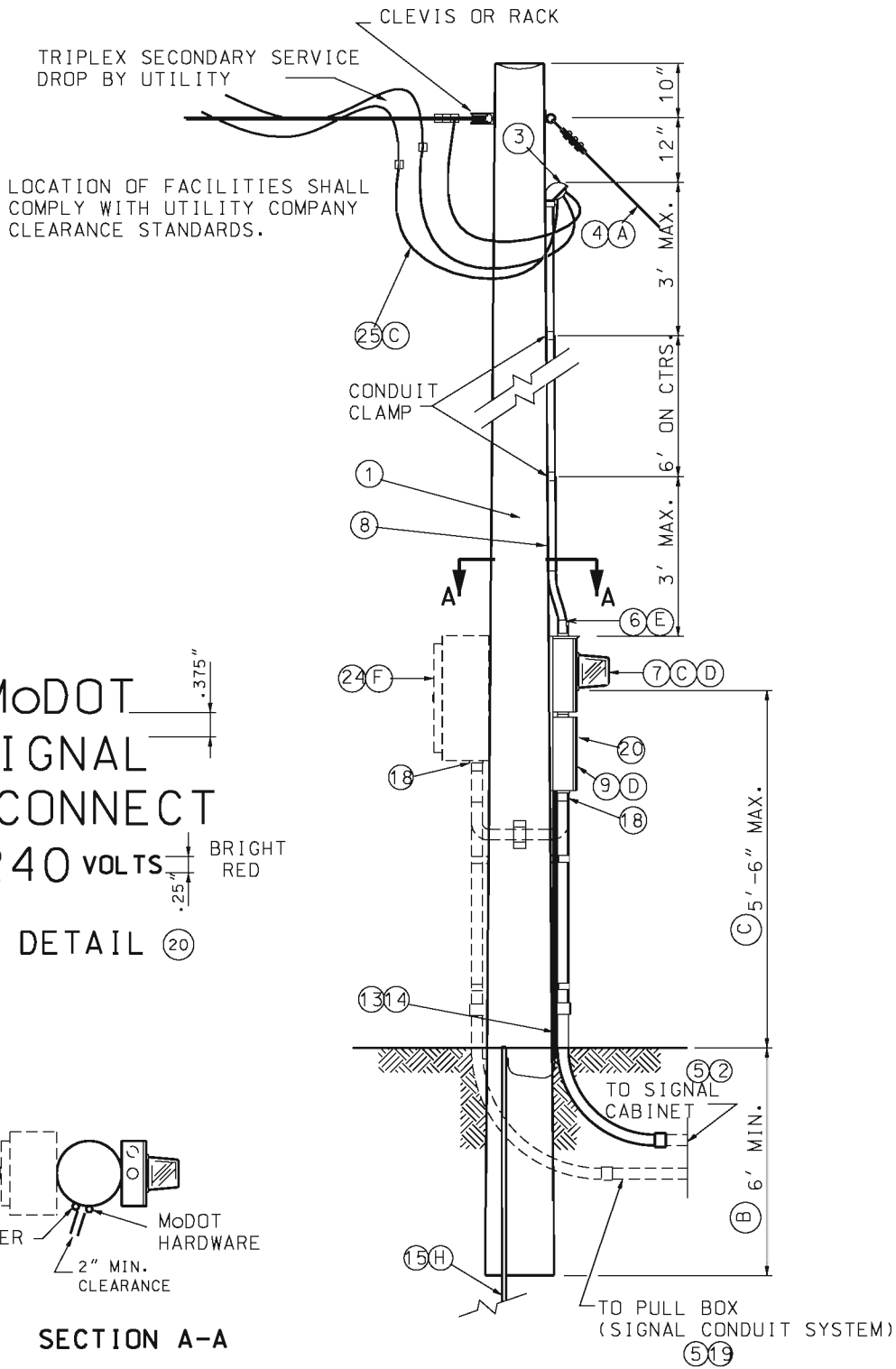
| LIST OF MATERIALS |                                                                          |
|-------------------|--------------------------------------------------------------------------|
| ITEM              | DESCRIPTION                                                              |
| 1                 | SERVICE POLE 30' MIN., CLASS IV WOOD, CONTRACTOR PROVIDED, MoDOT OWNED * |
| 2                 | #8 AWG MIN. CABLE, 600 VOLT *                                            |
| 3                 | SERVICE ENTRANCE HEAD                                                    |
| 4                 | GUY CABLE, AS REQUIRED                                                   |
| 5                 | 2" MIN. RIGID CONDUIT WITH PREFORMED ELBOWS                              |
| 6                 | LIGHTNING ARRESTOR, VALVE TYPE, 2 POLE, 650 VOLT                         |
| 7                 | METER SOCKET, 200 AMP, FOR SIGNALS                                       |
| 8                 | 2" MIN. RIGID CONDUIT                                                    |
| 9                 | SERVICE DISCONNECT BOX, LOCKING, RAIN TIGHT, NEMA 4                      |
| 10                | INSULATED, GROUNDABLE NEUTRAL, 200 AMP MINIMUM                           |
| 11                | SIGNAL BREAKER, SINGLE POLE, 40A MIN, TYPE A OR B *                      |
| 12                | LIGHTING BREAKER, SINGLE POLE, 40A, TYPE A OR B                          |
| 13                | METAL CONDUIT, 1/2"                                                      |
| 14                | GROUND WIRE, #2 AWG MIN.                                                 |
| 15                | GROUND ROD, 3/4" x 8' MIN.                                               |
| 16                | #8 AWG MIN. CABLE, 600 VOLT                                              |
| 17                | CLASS B CONCRETE, 0.92 C.Y. ±                                            |
| 18                | THREADED CONDUIT HUB WITH SEALING WASHERS                                |
| 19                | LIGHTING CABLES *                                                        |
| 20                | WEATHERPROOF ADHESIVE LABEL (SIGNALS) VINYL RAISED LETTERING             |
| 21                | TYPE B CONTROLLER AND SIGNAL BREAKER, AS SPECIFIED.                      |
| 22                | TYPE B AUXILIARY BREAKER, 15 AMP                                         |
| 23                | W6 x 9 OR W6 x 15 GALVANIZED POST                                        |
| 24                | LIGHTING CONTROL CABINET (SEE SHEET 2)                                   |
| 25                | #2 AWG MIN. CABLE, 600 VOLT                                              |
| *                 | SEE PLANS                                                                |



POWER SUPPLY      SIGNAL CABINET  
POWER PANEL  
**WIRING DIAGRAM**  
**SIGNALS AND/OR LIGHTING**



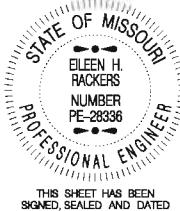
**SECTION A-A**



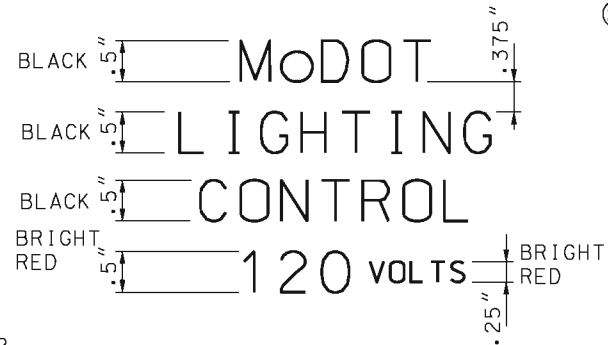
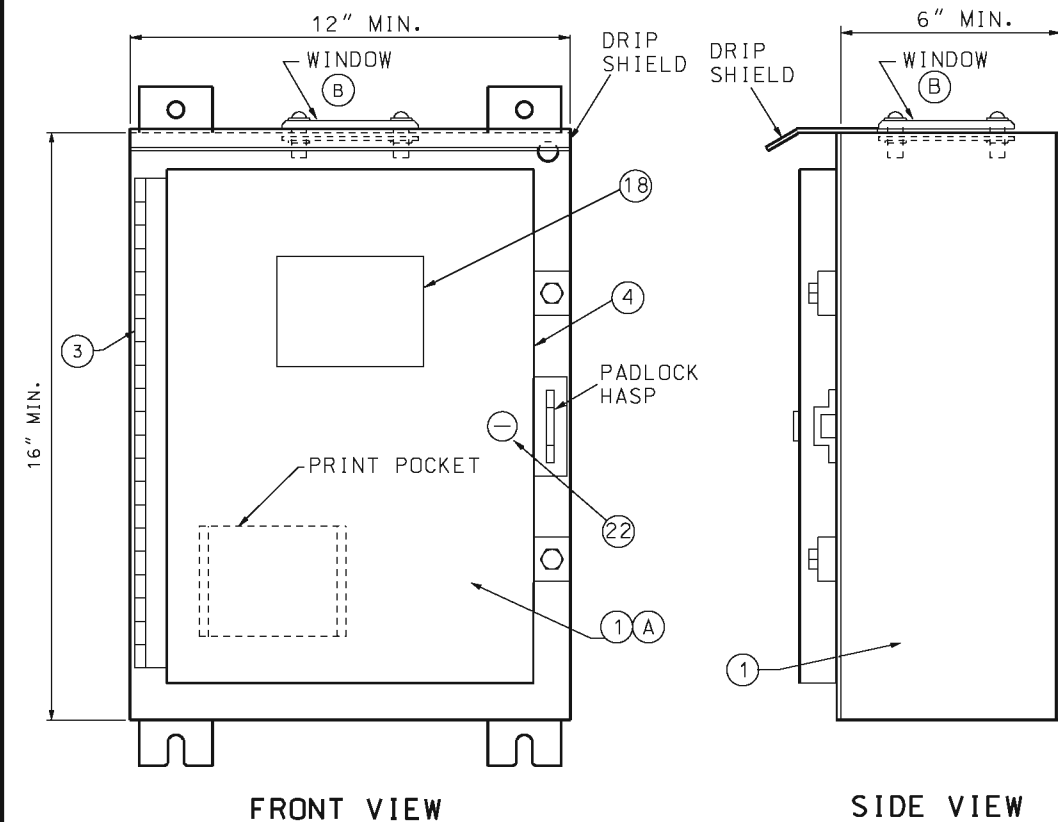
**TYPE 1 (POLE)**  
**OVERHEAD SERVICE**

- NOTES
- (A) SERVICE POLE SHALL BE GUYED WHEN SPAN OF OVERHEAD SERVICE WIRE EXCEEDS 50'.
  - (B) INCREASE 1 FOOT FOR EACH 5 FEET ABOVE 50 FEET.
  - (C) SERVICE DISCONNECT BOXES AND METER BOXES SHALL BE ALUMINUM OR STAINLESS STEEL. ALL HARDWARE, HINGES, CATCHES, ETC. SHALL BE STAIN-LESS STEEL. METER SOCKET AND OTHER EQUIPMENT AND MATERIALS SHALL BE U.L. APPROVED, AND CONFORM TO THE REQUIREMENTS OF THE UTILITY COMPANY OR MUNICIPALITY PROVIDING POWER.
  - (D) SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF DOOR.
  - (E) UTILITY COMPANY SHALL DECIDE IF LIGHTNING ARRESTERS ARE TO BE CONNECTED ON THE LOAD OR LINE SIDE OF THE METER. THE UTILITY COMPANY SHALL ALSO DECIDE IF THE LIGHTNING ARRESTER IS TERMINATED IN THE METER OR DISCONNECT CABINET, IF TERMINATED IN THE DISCONNECT CABINET, IT SHALL BE INSTALLED ON THE CONNECT CABINET
  - (F) IF LIGHTING IS SPECIFIED, INSTALL LIGHTING CONTROL ON POWER SUPPLY.
  - (G) BREAKERS SHALL CONFORM TO SEC. 901.4 OF THE STANDARD SPECIFICATIONS.
  - (H) IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CAD WELDED.

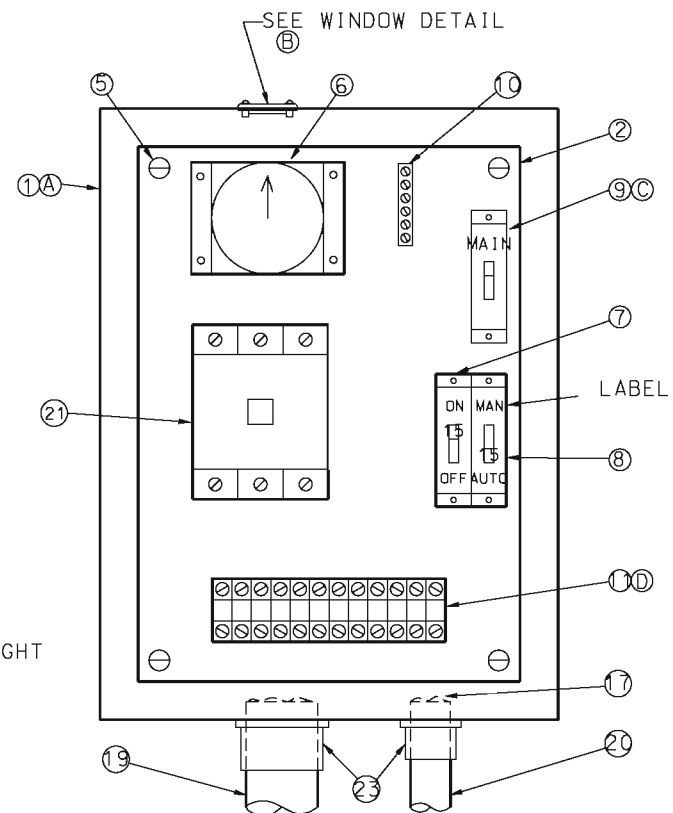
- GENERAL NOTES:
- FOR CABLE TYPES AND INSTALLATION, SEE STANDARD SPECIFICATIONS.
- THE TYPE POWER SUPPLY ASSEMBLY IS SHOWN ON THE PLANS OR IS DESIGNATED IN THE CONTRACT.
- THE UTILITY COMPANY SHALL BE NOTIFIED IN WRITING 30 DAYS PRIOR TO DATE SERVICE WILL BE REQUIRED.
- WHERE SIGNAL OR LIGHTING POWER ONLY IS DESIGNATED, OMIT ITEMS NOT REQUIRED.
- ALL OPENINGS IN ANY SERVICE BOX OR METER BOX SHALL BE COVERED AND SEALED WITH LIFETIME SILICONE CAULK.
- ALL MATERIALS REQUIRED EXCLUDING REFERENCE ITEMS AS SHOWN ON DRAWING SHALL BE INCLUDED IN PRICE BID FOR POWER SUPPLY ASSEMBLY.

|                                                                                                                                                                                                                                                       |                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                      |                                                                                       |
|  <b>STATE OF MISSOURI</b><br>EILEEN H. RACKERS<br>NUMBER PE-28336<br>PROFESSIONAL ENGINEER<br>THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY. | <b>TRAFFIC SIGNALS</b><br><b>POWER SUPPLY ASSEMBLY</b><br><b>240/120 VOLT SERVICE</b> |
| DATE EFFECTIVE: 07/01/2004<br>DATE PREPARED: 8/26/2009                                                                                                                                                                                                | SHEET NO.<br><b>902.15K</b><br>2 OF 3                                                 |

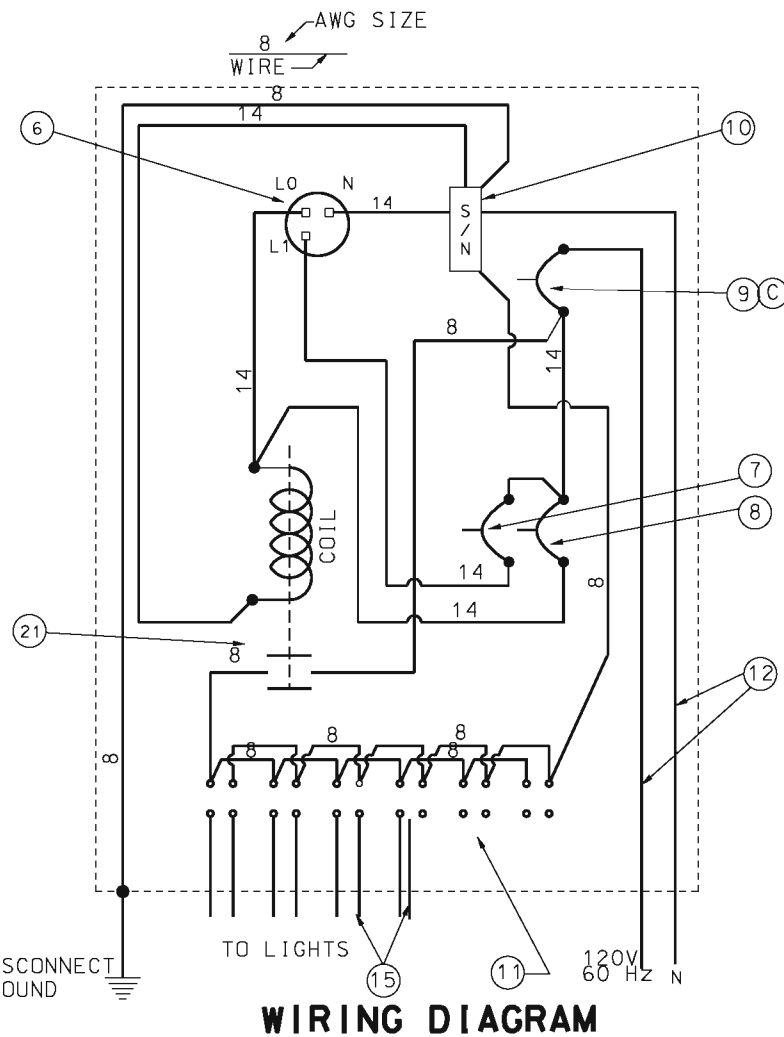
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



### LABEL DETAIL



## EQUIPMENT LAYOUT



| LIST OF MATERIALS |                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------|
| ITEM              | DESCRIPTION                                                                               |
| 1                 | CABINET, WATERTIGHT, NEMA 4, 14 GA MINIMUM THICKNESS                                      |
| 2                 | PANEL, 12 GA MINIMUM THICKNESS, ALUMINUM OR STAINLESS STEEL                               |
| 3                 | CONTINUOUS STAINLESS STEEL HINGE                                                          |
| 4                 | NEOPRENE GASKET DOOR                                                                      |
| 5                 | 3/8" - 16 COLLAR STUD                                                                     |
| 6                 | PHOTOELECTRIC SWITCH AND SOCKET, 105/285 V., 1000 WATT                                    |
| 7                 | 15 AMP CONTROL BREAKER, SINGLE POLE, TYPE B                                               |
| 8                 | 15 AMP AUTO-MANUAL SWITCH, SINGLE POLE BREAKER, TYPE B, WITH LABEL                        |
| 9                 | MAIN BREAKER, SINGLE POLE, TYPE B *                                                       |
| 10                | NEUTRAL TERMINAL STRIP                                                                    |
| 11                | LIGHTING TERMINAL BLOCK, INSULATED FROM BACK PANEL, 12 POSITION (E)                       |
| 12                | POWER, CABLE, #8 AWG MIN., 600 V.                                                         |
| 13                | FILTER, TRANSLUCENT, PLEXIGLASS #W2067, 1 8" THICK                                        |
| 14                | CLEAR, LEXAN #9034 WINDOW, 1/4" THICK MIN. EXCEPT FOR 15A BREAKER; MIN. WIRE SIZE 10 AWG. |
| 15                | CABLE, LIGHTING *                                                                         |
| 16                | LIFETIME SILICONE CAULK                                                                   |
| 17                | PLIABLE DUCT SEALANT                                                                      |
| 18                | LABEL-WEATHERPROOF ADHESIVE-VINYL RAISED LETTERING (OR EQUIV.) (SEE DETAIL)               |
| 19                | CONDUIT, RIGID, 2" MIN. *                                                                 |
| 20                | CONDUIT, RIGID, 1" MIN.                                                                   |
| 21                | LIGHTING CONTACTOR, 2 POLE, 30 AMP, 600 VOLT, 120 VOLT COIL                               |
| 22                | #2 CORBIN LOCK                                                                            |
| 23                | THREADED CONDUIT HUB WITH SEALING WASHERS                                                 |
| *                 | SEE PLANS                                                                                 |

(A) SCHEMATIC DIAGRAM SHALL BE MOUNTED ON INSIDE OF CABINET DOOR.

(B) PHOTOELECTRIC SWITCH BRACKETS MAY VARY. LOCATE CENTER OF WINDOW OVER CENTER OF PHOTOELECTRIC SWITCH.

(C) MAIN BREAKER SIZE:

| TOTAL LUMINAIRE**<br>LOAD (WATTS) | BREAKER SIZE<br>(AMPS) | MIN. AWG |
|-----------------------------------|------------------------|----------|
| 0-920                             | 15                     | 10       |
| 930-1260                          | 20                     | 8        |
| 1270-1600                         | 25                     | 8        |
| 1610-1930                         | 30                     | 8        |

\*\* EXCLUDING BALLAST LOAD

(D) TERMINAL BLOCK SHALL BE RATED AT 600V, SHALL ACCEPT WIRES UP TO 8 AWG AND SHALL HAVE A BARRIER BETWEEN EACH TERMINAL AND ON EACH END.

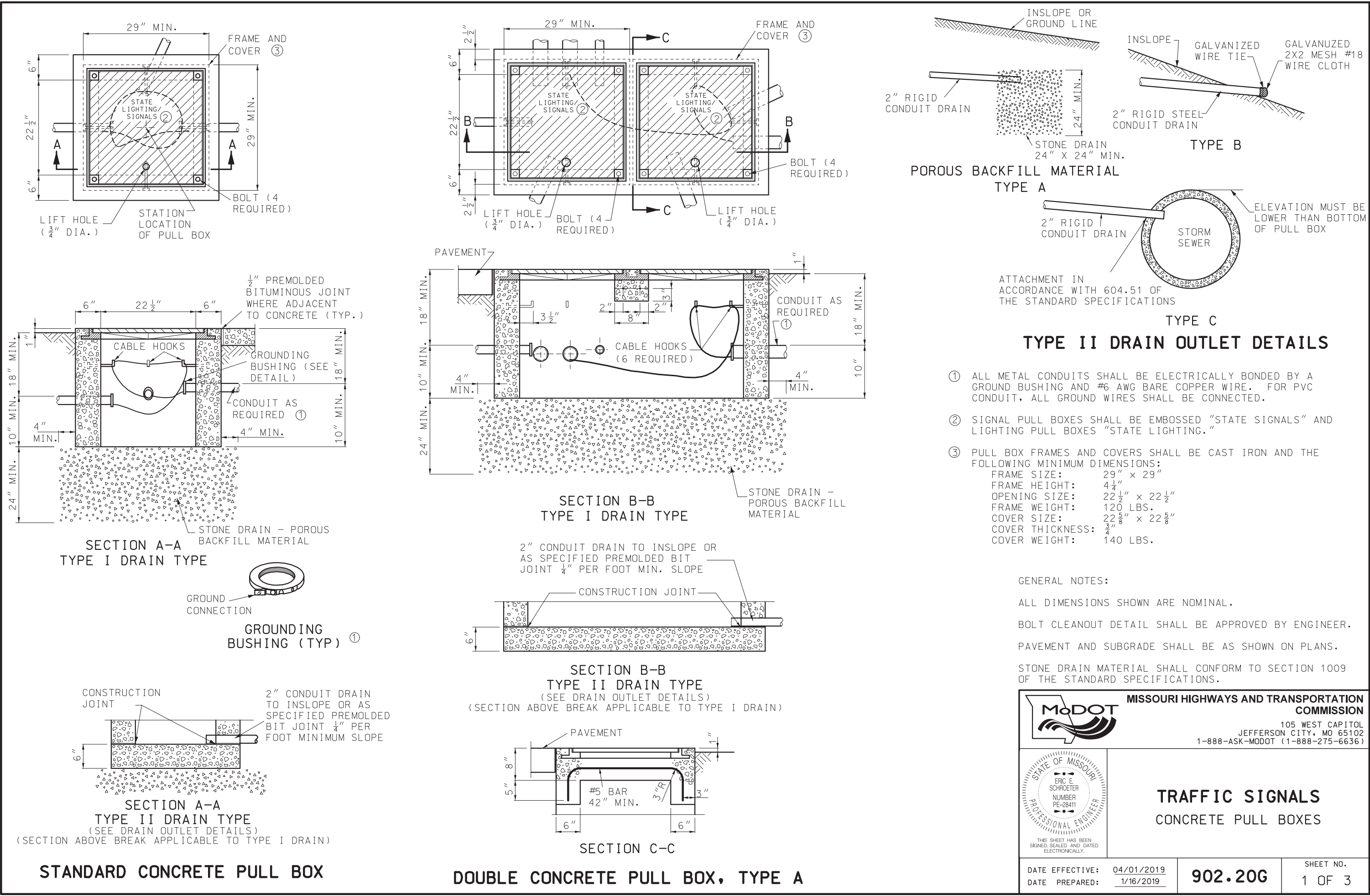
ALL OPENINGS IN CABINET SHALL BE COVERED AND SEALED WITH LIFETIME SILICONE CAULK.

ALL CIRCUIT BREAKERS SHALL CONFORM TO SECTION 901.4 OF THE STANDARD SPECIFICATIONS.

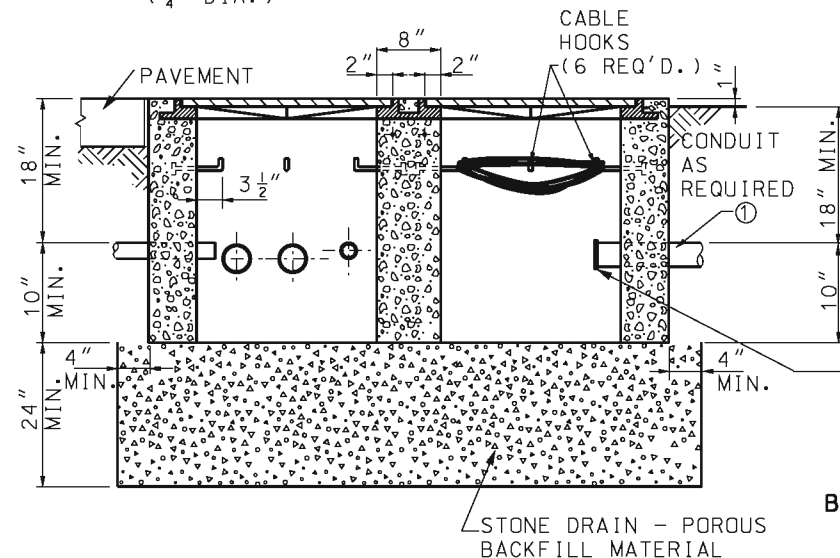
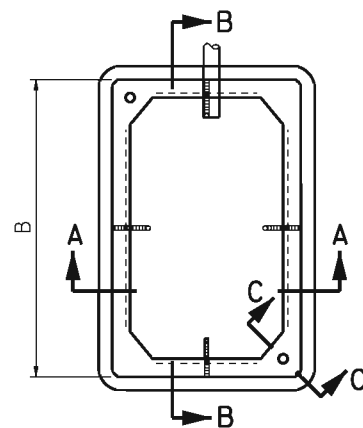
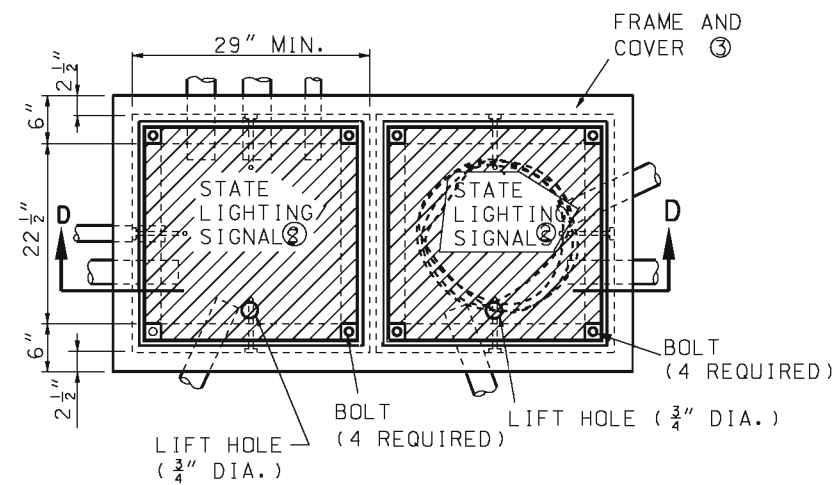
PLACEMENT OF ALL ITEMS SHALL BE APPROVED BY THE ENGINEER.

CABINET SHALL BE LOCATED AWAY FROM TRAFFIC. TOP MOUNT PHOTO CONTROL SHALL FACE AN OPEN SKY. SIDE MOUNT PHOTO CONTROL SHALL FACE NORTH.

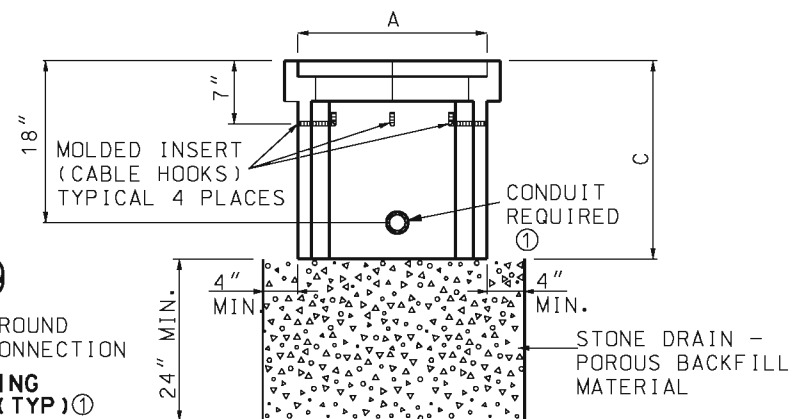
|                                                                                                                                                                   |  |                                                                                                                                                |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                              |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |
|  <p>THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> |  | <b>TRAFFIC SIGNALS</b><br><b>POWER SUPPLY ASSEMBLY</b><br><b>240/120 VOLT SERVICE</b>                                                          |  |
| DATE EFFECTIVE: <u>07/01/2004</u><br>DATE PREPARED: <u>8/26/2009</u>                                                                                              |  | <b>902.15K</b><br>SHEET NO.<br><b>3 OF 3</b>                                                                                                   |  |



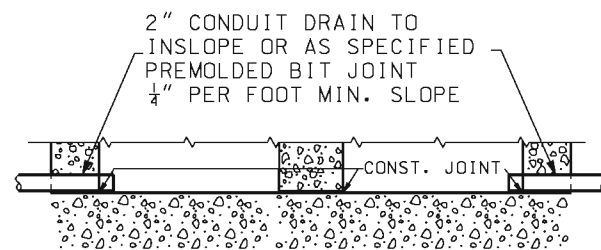
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



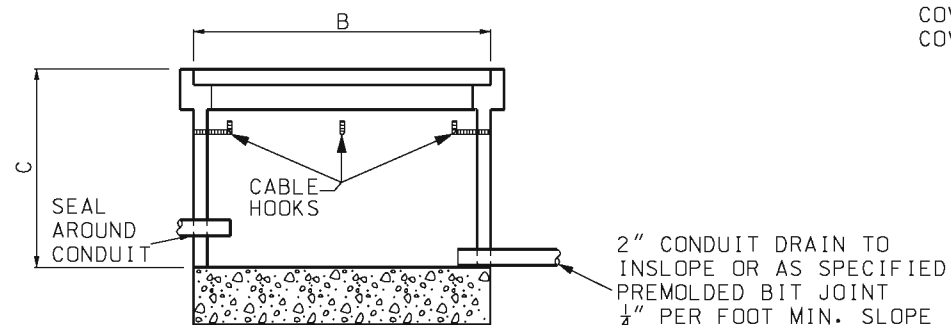
SECTION D-D  
TYPE I DRAIN TYPE



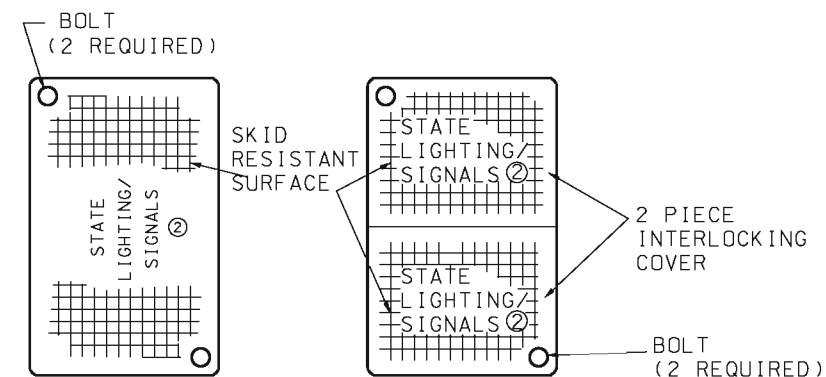
SECTION A-A  
TYPE I DRAIN TYPE



TYPE II DRAIN TYPE  
(SEE DRAIN OUTLET DETAILS)  
(SECTION ABOVE BREAK APPLICABLE TO TYPE I DRAIN.)  
**DOUBLE CONCRETE PULL BOX, TYPE B**



SECTION B-B  
TYPE II DRAIN TYPE  
**PREFORMED PULL BOX**



CLASS 1 OR 2  
CLASS 3  
**PREFORMED PULL BOX COVER**

| NUMBER OF ENTERING CONDUCTORS | CLASS | PREFORMED PULL BOX MINIMUM DIMENSIONS |     |     |
|-------------------------------|-------|---------------------------------------|-----|-----|
|                               |       | A                                     | B   | C   |
| < 23                          | 1     | 17"                                   | 30" | 22" |
| 23 - 68                       | 2     | 24"                                   | 36" | 24" |
| > 68                          | 3     | 30"                                   | 48" | 36" |

- ALL METAL CONDUITS SHALL BE ELECTRICALLY BONDED BY A GROUND BUSHING AND #6 AWG BARE COPPER WIRE. FOR PVC CONDUIT, ALL GROUND WIRES SHALL BE CONNECTED.
- SIGNAL PULL BOXES SHALL BE EMBOSSED "STATE SIGNALS" AND LIGHTING PULL BOXES "STATE LIGHTING."
- PULL BOX FRAMES AND COVERS SHALL BE CAST IRON AND THE FOLLOWING MINIMUM DIMENSIONS:  
 FRAME SIZE: 29" x 29"  
 FRAME HEIGHT: 4 1/4"  
 OPENING SIZE: 22 1/2" x 22 1/2"  
 FRAME WEIGHT: 120 LBS.  
 COVER SIZE: 22 5/8" x 22 5/8"  
 COVER THICKNESS: 3/4"  
 COVER WEIGHT: 140 LBS.

GENERAL NOTES:

IF AN EXTENSION IS USED WITH A PREFORMED BOX, THE LIP OF THE EXTENSION MAY BE INTERIOR OR EXTERIOR. THE EXTENSION SHALL BE COMPATIBLE AND FROM THE SAME MANUFACTURER.

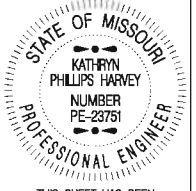
IF PREFORMED PULL BOXES ARE SPECIFIED, THE CONTRACTOR MAY USE THE STANDARD CONCRETE PULL BOX IN LIEU OF THE CLASS 1 OR 2 PREFORMED PULL BOX OR THE DOUBLE CONCRETE PULL BOX, TYPE A, IN LIEU OF THE CLASS 3 PREFORMED PULL BOXES.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**TRAFFIC SIGNALS**  
**CONCRETE AND PREFORMED**  
**PULL BOXES**

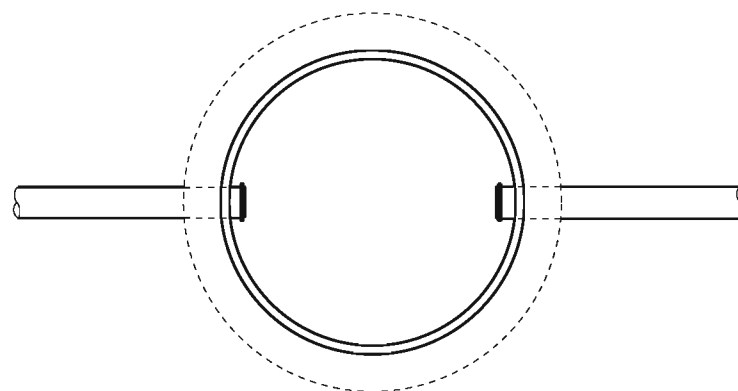
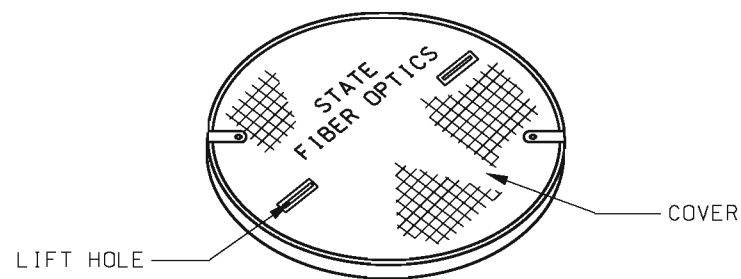


THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

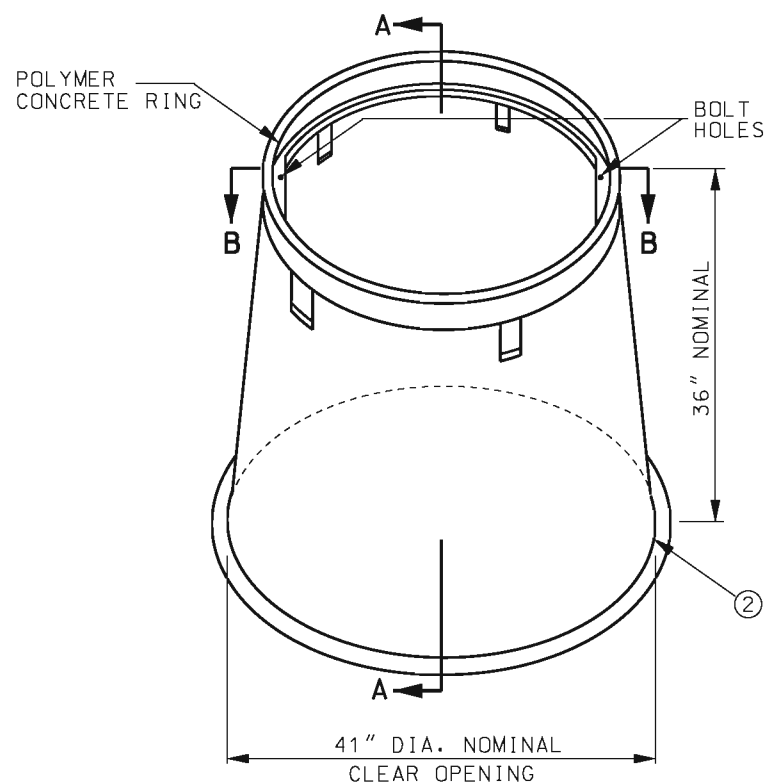
**DATE EFFECTIVE: 11/01/2010**  
**DATE PREPARED: 9/3/2010**

**902.20G**

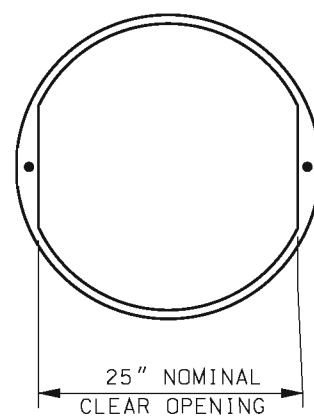
**SHEET NO.**  
**2 OF 3**



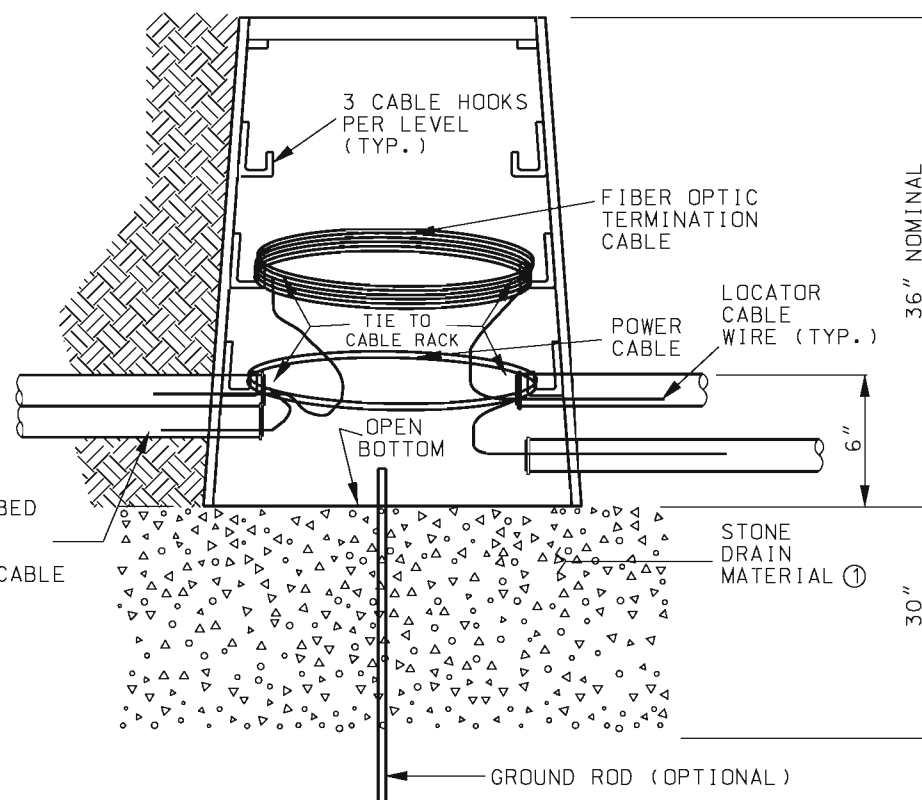
PLAN



CIRCULAR PULL BOX  
CLASS 5



SECTION B-B



SECTION A-A  
TYPE I DRAIN TYPE

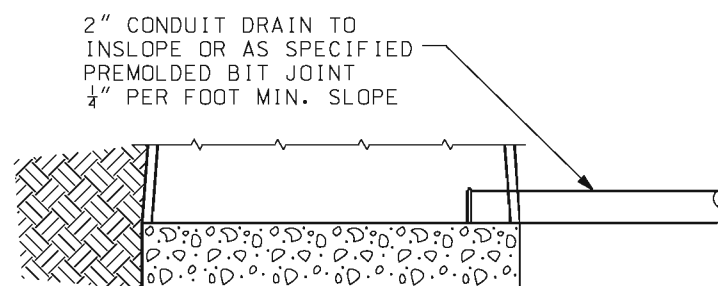
- ① AGGREGATE SHALL BE TYPE 1 CONFORMING TO SEC 1007.
- ② BOX SHALL BE OF A FLARE DESIGN AND HAVE A LIP FOR STABILIZATION.

GENERAL NOTES:

A MINIMUM OF NINE HOOKS, INSTALLED IN THREE LEVELS, SHALL BE INCLUDED WITH EACH PULL BOX.

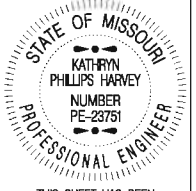
IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CADWELDED.

THE CIRCULAR PULL BOX COVER SHOULD BE SIZED TO FIT A BOX WITH A CLEAR OPENING OF 25".

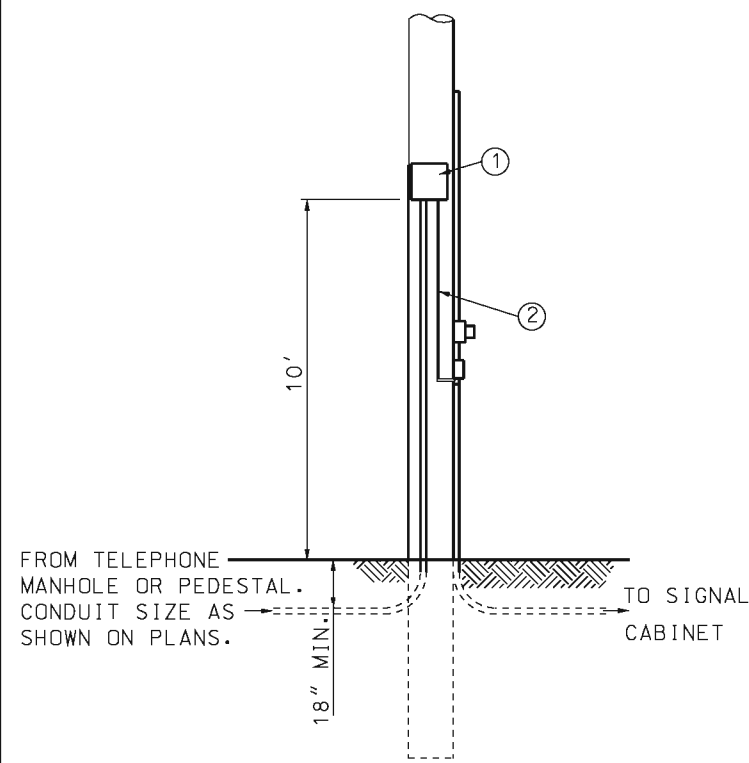


TYPE II DRAIN TYPE

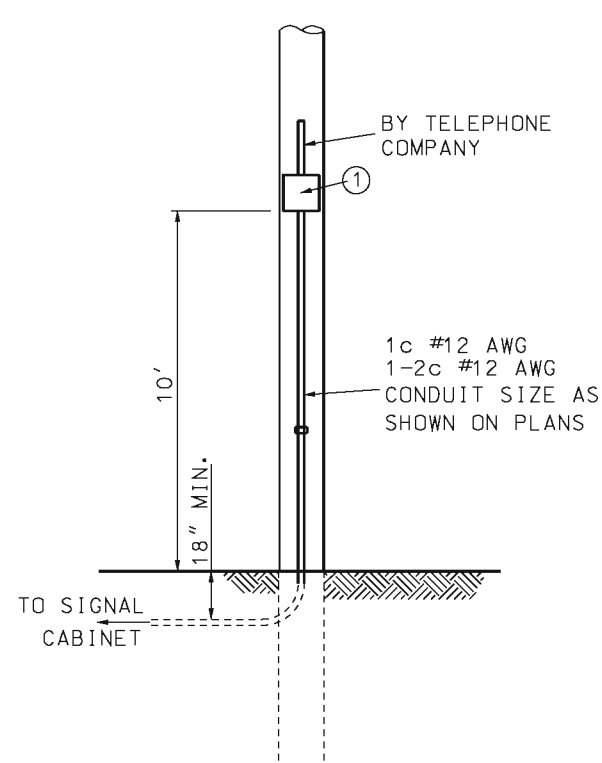
(SEE DRAIN OUTLET DETAILS)  
(SECTION ABOVE BREAK APPLICABLE TO TYPE I DRAIN.)

|                                                                                                                                                                                                                                  |                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                              |
|                                                                                                                                             | <b>TRAFFIC SIGNALS</b><br><b>CONCRETE AND PREFORMED</b><br><b>PULL BOXES</b> |
| DATE EFFECTIVE: 11/01/2010<br>DATE PREPARED: 9/3/2010                                                                                                                                                                            | <b>902.20G</b>                                                               |
| SHEET NO.<br><b>3 OF 3</b>                                                                                                                                                                                                       |                                                                              |

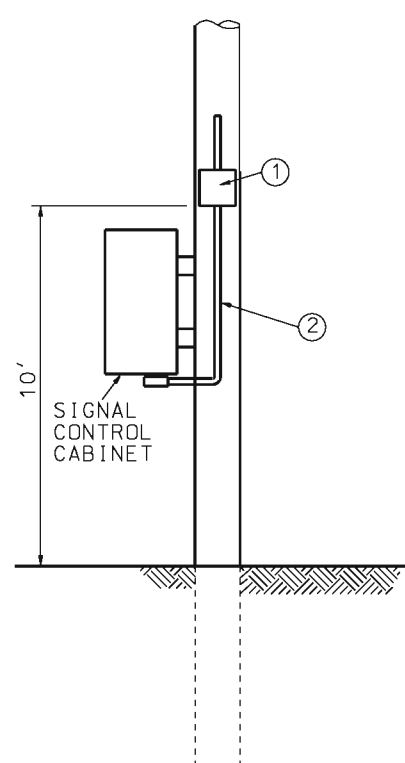




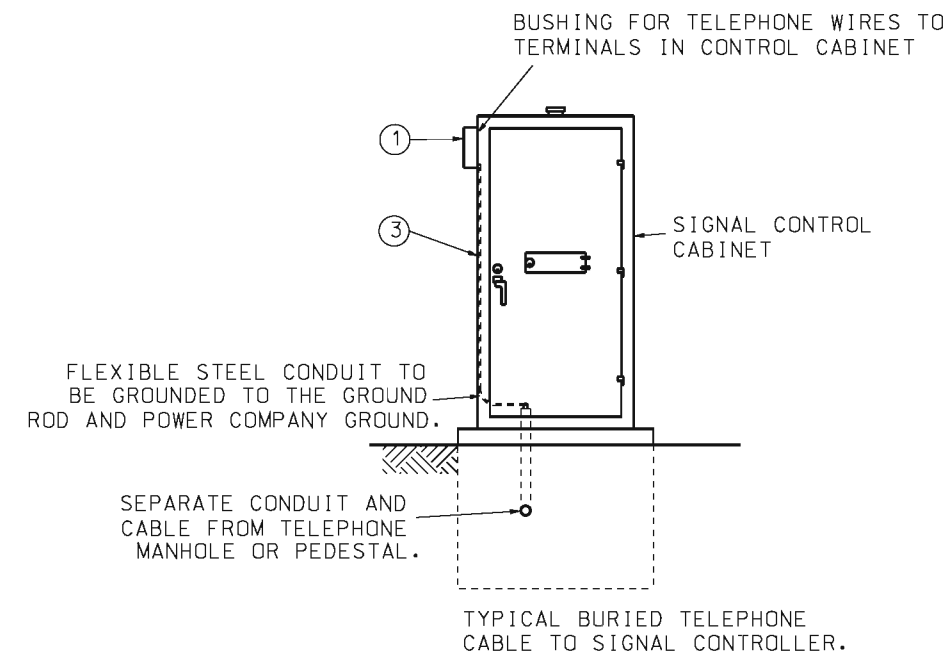
**TYPE 902.10-U**  
USE ON EXISTING ONLY



TELEPHONE OR UTILITY COMPANY POLE  
**TYPE TPA**  
USE ON NEW OR EXISTING

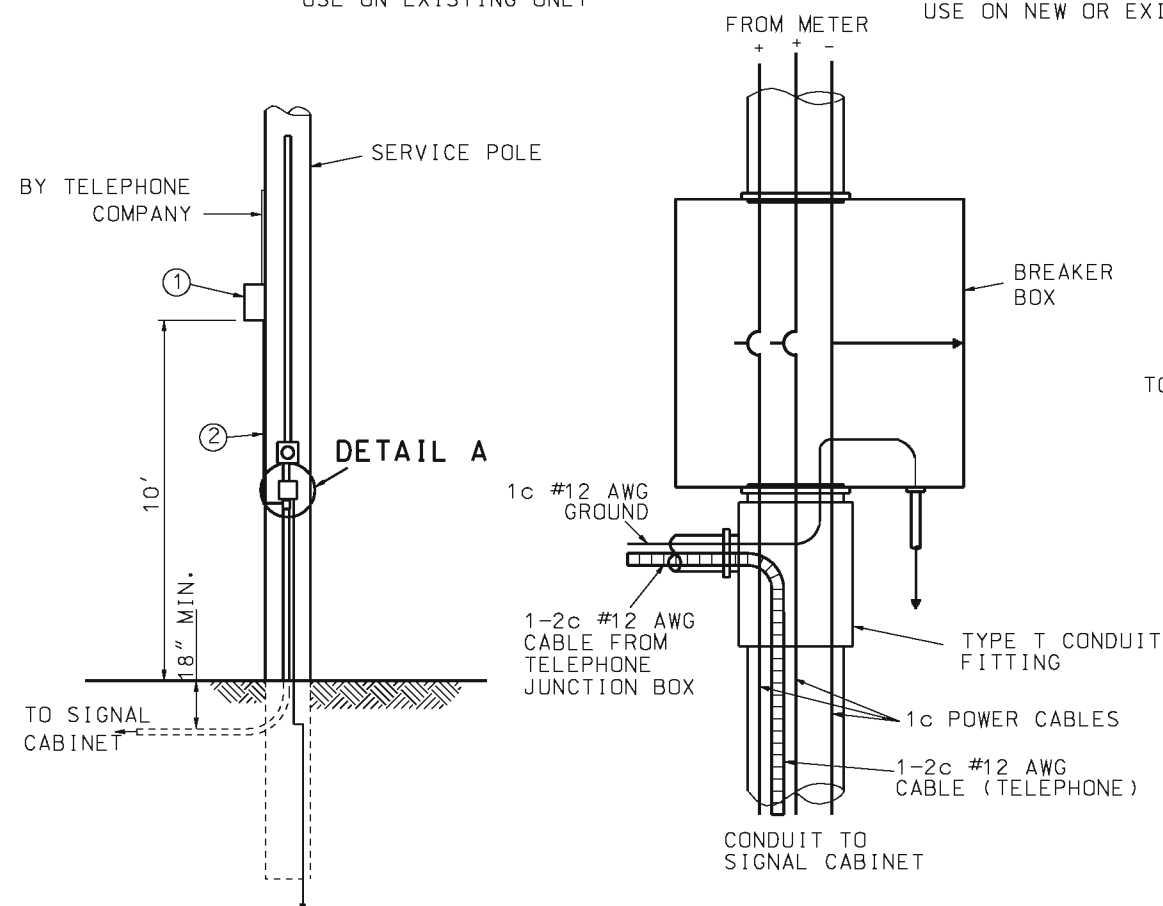


**TYPE SWA**  
USE ON NEW OR EXISTING



**TYPE CU**  
USE ON NEW ONLY

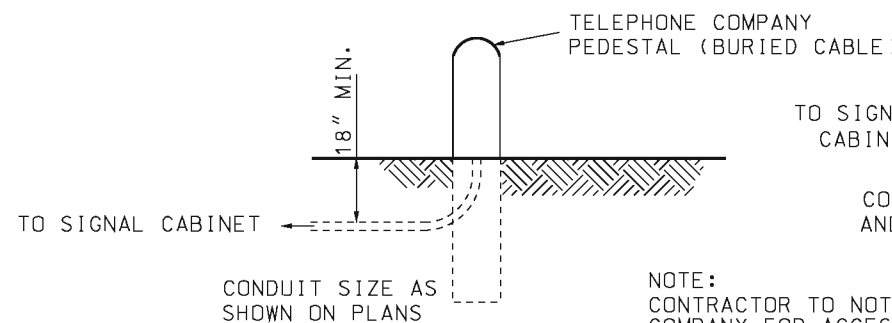
NOTE:  
WIRING FROM TELEPHONE COMPANY PEDESTAL OR MANHOLE  
WILL BE FURNISHED AND INSTALLED BY TELEPHONE COMPANY.



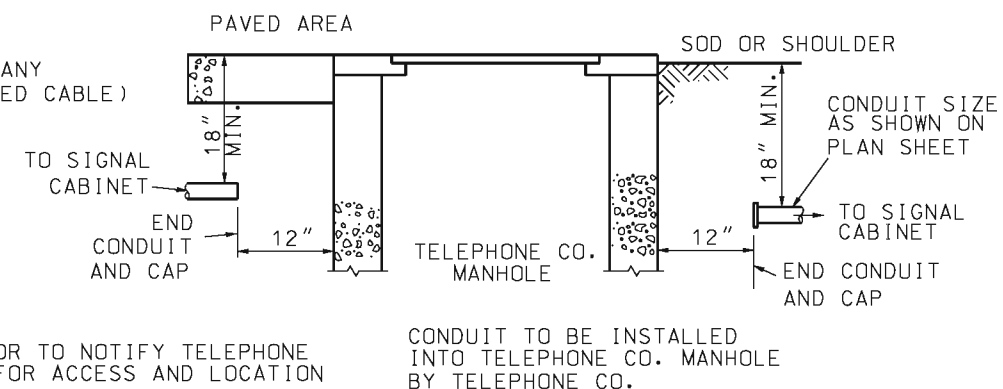
**TYPE 902.10-A**  
USE ON EXISTING ONLY

**DETAIL A**

## AERIAL TELEPHONE CONNECTION



**TYPE CP**  
USE ON NEW OR EXISTING



**TYPE CM**  
USE ON NEW OR EXISTING

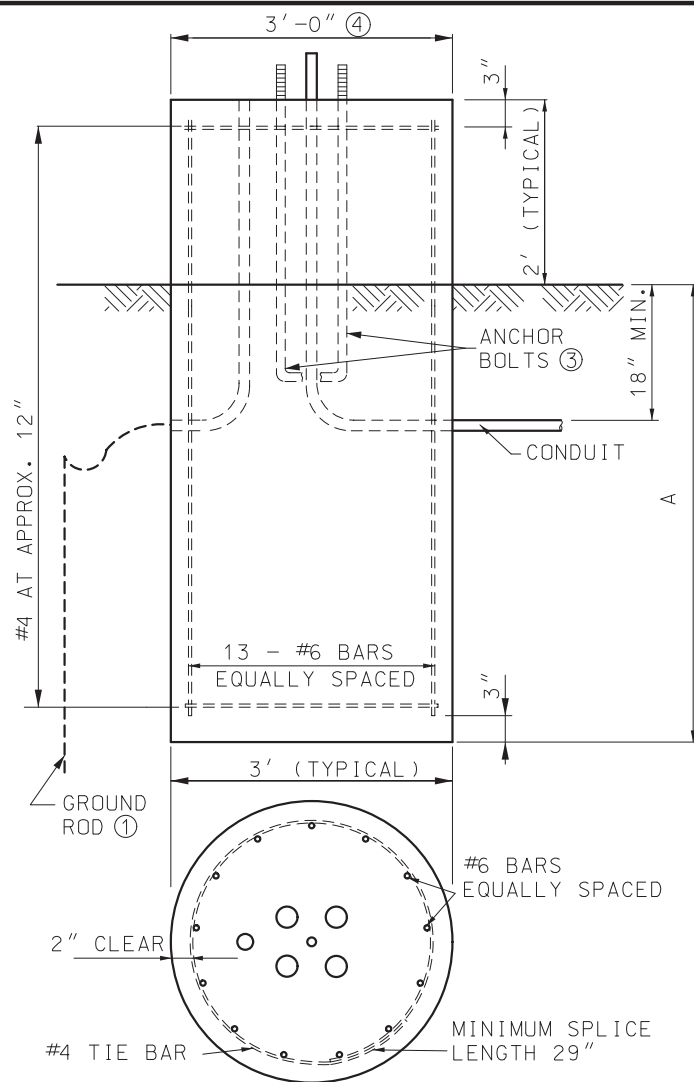
## UNDERGROUND TELEPHONE CONNECTION

NOTE:  
SCHEMATIC DIAGRAM APPLIES TO  
STANDARD PLANS 901.80 AND 902.15.

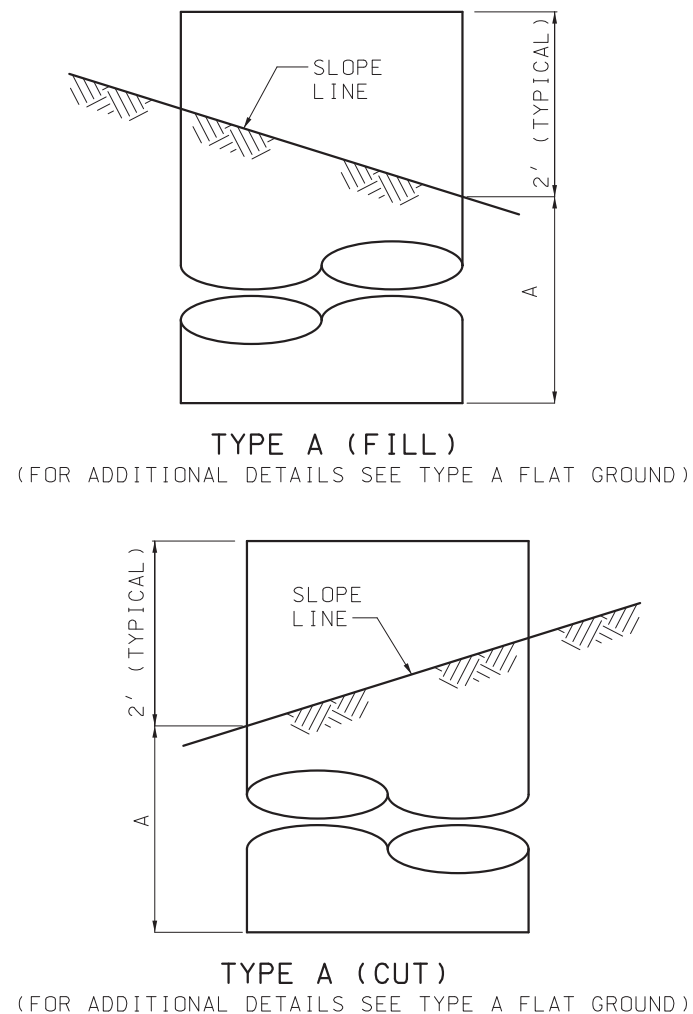
- ① 12" x 12" x 6" JUNCTION BOX WITH  $\frac{3}{4}$ " TO 1  $\frac{1}{2}$ " KNOCK-OUT IN BOTTOM.
- ②  $\frac{3}{4}$ " MINIMUM METAL CONDUIT CONTAINING 1-2c #12 AWG AND 1c #12 AWG.
- ③  $\frac{3}{4}$ " MINIMUM FLEXIBLE CONDUIT CONTAINING 1-2c #12 AWG AND 1c #12 AWG.

ALL ITEMS CONTRACTOR FURNISHED AND INSTALLED.

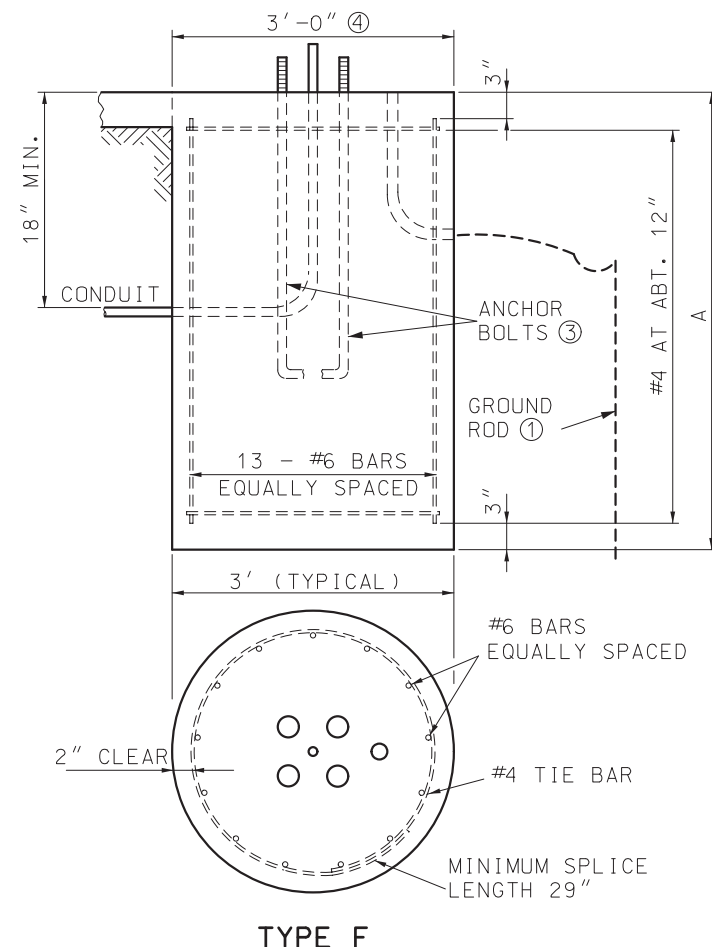
|                                                                                                                                                                                                                                  |                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                         |
|                                                                                                                                             | <b>TRAFFIC SIGNALS</b><br><b>TELEPHONE INTERCONNECT</b> |
| DATE EFFECTIVE: 03/01/1996<br>DATE PREPARED: 8/26/2009                                                                                                                                                                           | <b>902.21C</b>                                          |
| SHEET NO.<br>1 OF 1                                                                                                                                                                                                              |                                                         |



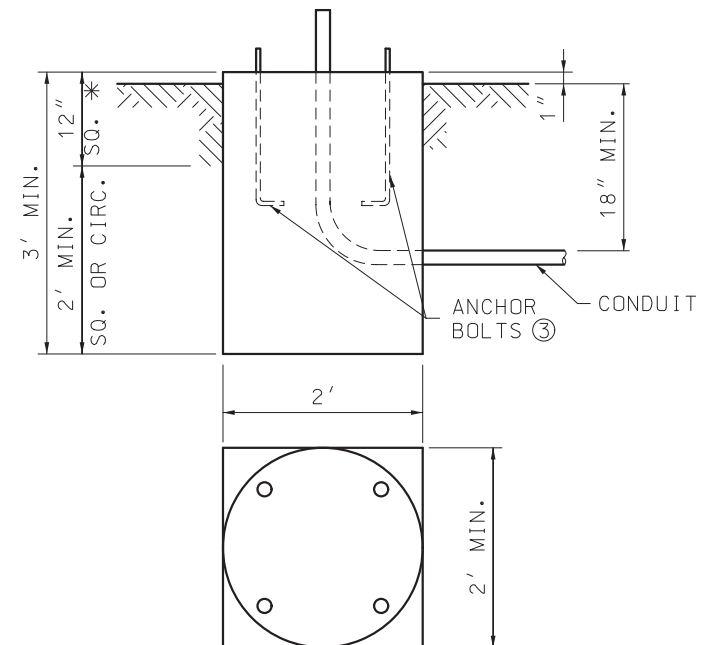
TYPE A (FLAT GROUND)



TYPE A (CUT)  
(FOR ADDITIONAL DETAILS SEE TYPE A FLAT GROUND)



TYPE F



\* SURFACE OF BASE TO BE CONSTRUCTED SQUARE FOR A DEPTH OF 12".

TYPE C

- ① APPLICABLE ONLY WHERE CONTROLLER IS MOUNTED TO A SIGNAL POLE.
- ② BASE PLATE SHALL STAY WITHIN THE TOP OF THE POST BASE DIAMETER.
- ③ ANCHOR BOLT DIMENSIONS ARE SHOWN ON THE MANUFACTURER'S APPROVED DRAWINGS.
- ④ MAXIMUM BOLT CIRCLE DIAMETER IS 26". BASE PLATE SHALL STAY WITHIN THE TOP OF THE POST BASE DIAMETER.
- ⑤ ARM LENGTH DETERMINED BY LENGTH OF LONGEST ARM FOR TYPE B & BL SIGNAL POSTS.
- ⑥ BASE TYPE A OR F DETERMINED BY LOCATION OF POST BASE.
- ⑦ SOIL DEPTH, NO ROCK.
- ⑧ WEIGHT INCLUDES #4 TIE BARS.
- ⑨ WHEN CONCRETE BASE IS LOCATED WITHIN 8" CONCRETE DIVISIONAL ISLAND, EMBEDMENT LENGTH MAY BE REDUCED BY 1/2 DIAMETER OF THE DRILLED SHAFT.

| POST BASES |                     |                  |
|------------|---------------------|------------------|
| POST TYPE  | ARM LENGTH (FEET) ⑤ | BASE TYPE ⑥      |
| C OR CL    | 15 - 25             | A-9 OR F-9       |
| C OR CL    | 30 - 35             | A-9.5 OR F-9.5   |
| C OR CL    | 40 - 55             | A-10.5 OR F-10.5 |
| B OR BL    | 15 - 25             | A-10 OR F-10     |
| B OR BL    | 30 - 35             | A-11 OR F-11     |
| B OR BL    | 40 - 55             | A-12 OR F-12     |

| STEEL AND CONCRETE REQUIREMENTS FOR POST BASES ⑨ |        |              |               |            |
|--------------------------------------------------|--------|--------------|---------------|------------|
| BASES                                            |        | #6 STEEL BAR | WEIGHT LBS. ⑧ | CONC. C.Y. |
| TYPE                                             | A ⑦    | LENGTH       |               |            |
| A-9                                              | 9'-0"  | 10'-6"       | 300           | 2.88       |
| A-9.5                                            | 9'-6"  | 11'-0"       | 310           | 3.01       |
| A-10                                             | 10'-0" | 11'-6"       | 320           | 3.14       |
| A-10.5                                           | 10'-6" | 12'-0"       | 330           | 3.27       |
| A-11                                             | 11'-0" | 12'-6"       | 350           | 3.40       |
| A-12                                             | 12'-0" | 13'-6"       | 380           | 3.67       |
| F-9                                              | 9'-0"  | 8'-6"        | 240           | 2.36       |
| F-9.5                                            | 9'-6"  | 9'-0"        | 250           | 2.49       |
| F-10                                             | 10'-0" | 9'-6"        | 270           | 2.62       |
| F-10.5                                           | 10'-6" | 10'-0"       | 280           | 2.75       |
| F-11                                             | 11'-0" | 10'-6"       | 300           | 2.88       |
| F-12                                             | 12'-0" | 11'-6"       | 320           | 3.14       |
| C*                                               |        |              |               | 0.44       |

\* SURFACE OF BASE TO BE CONSTRUCTED SQUARE FOR A DEPTH OF 12".

## POST BASES

| BASE EMBEDMENT IN SOLID ROCK  |                    |
|-------------------------------|--------------------|
| SOLID ROCK ENCOUNTER POINT    | REQUIRED EMBEDMENT |
| AT SURFACE                    | 4'-9"              |
| AT ONE-FOURTH NORMAL DEPTH    | 4'-0"              |
| AT ONE-HALF NORMAL DEPTH      | 3'-3"              |
| AT THREE-FOURTHS NORMAL DEPTH | 1'-3"              |

1. REQUIRED EMBEDMENT DEPTHS CAN BE INTERPOLATED BETWEEN ENCOUNTER POINTS FOR OTHER SOLID ROCK ENCOUNTER DEPTHS.
2. NORMAL LENGTHS FOR ANCHOR BOLTS AND REINFORCING STEEL WILL BE REQUIRED.
3. CORE DRILL HOLES FOR ANCHOR BOLTS AND REINFORCING STEEL IN SOLID ROCK SHALL BE PROVIDED. CORE DRILL HOLES SHALL BE TWICE THE DIAMETER OF THE ANCHOR BOLT AND REINFORCING STEEL DIAMETER AND TO WITHIN 3 INCHES OF THE NORMAL BASE DEPTH.
4. IF SOIL, SHALE, GRAVEL, FRACTURED ROCK, OR VOIDS ARE ENCOUNTERED DURING CORE DRILLING, THE ROCK SHALL BE REMOVED TO THE POINT OF ENCOUNTER.
5. ANCHOR BOLTS AND REINFORCING STEEL SHALL BE GROUTED IN THE CORE DRILL HOLES WITH NON-SHRINK GROUT HAVING A MINIMUM STRENGTH OF 9,000 POUNDS IN 24 HOURS.
6. STRAIGHT ANCHOR BOLTS OF THE LENGTH SHOWN IN THE ANCHOR BOLT TABLE UNDER THE COLUMN "BOLT LENGTH" ARE ADEQUATE FOR USE IN GROUTED CORE DRILLED HOLES.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

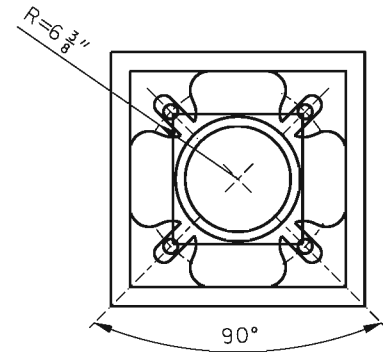
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**TRAFFIC SIGNALS  
POST BASES**

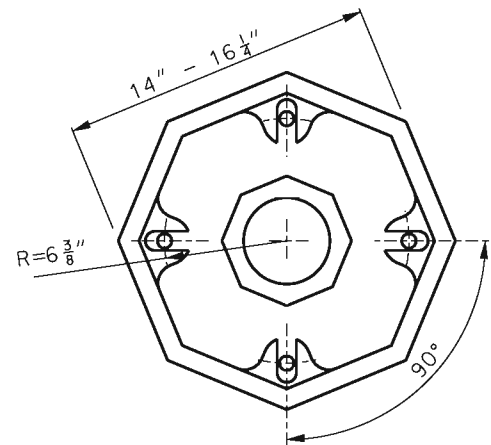
DATE EFFECTIVE: 4/1/2024  
DATE PREPARED: 1/8/2024

**902.30P**

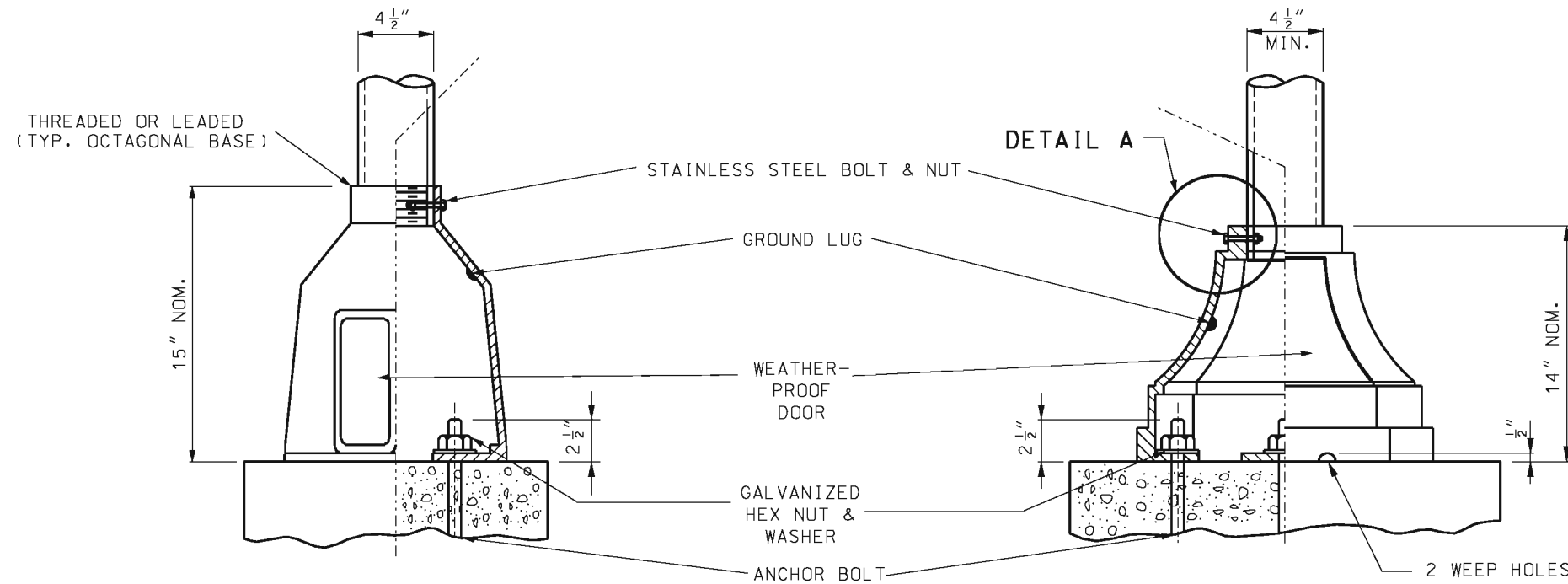
SHEET NO.  
1 OF 2



BOLT CIRCLE



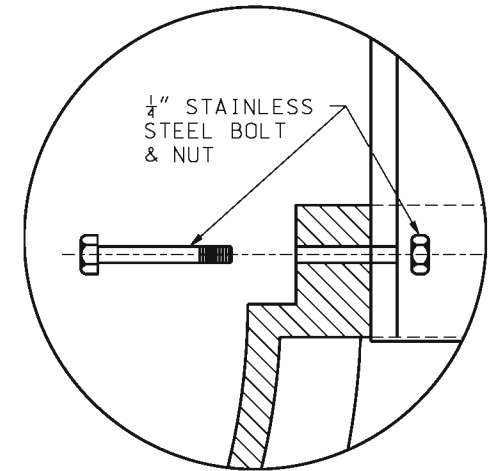
BOLT CIRCLE



SQUARE

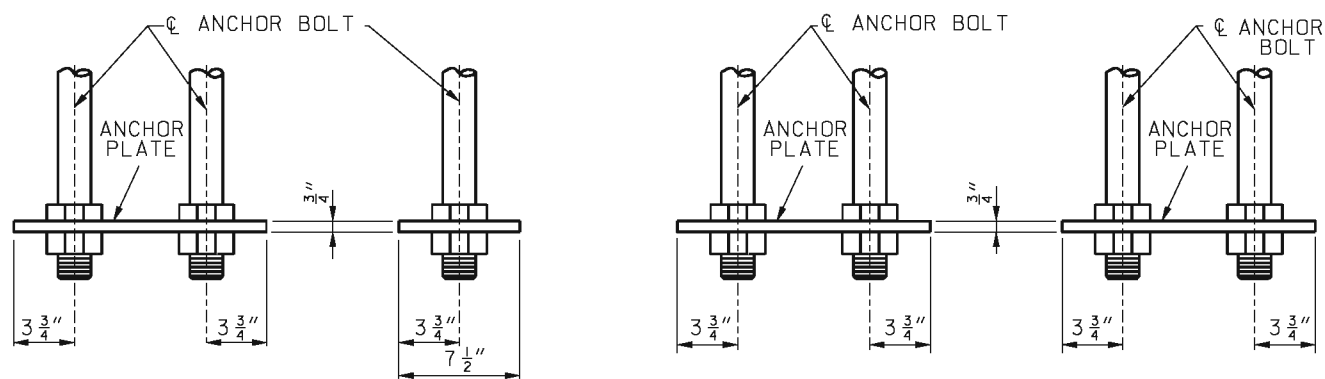
OCTAGONAL

CAST BASE



DETAIL A

| BOLT LENGTH<br>INCHES | VERT. HT. A<br>INCHES | THREAD LEN. B<br>INCHES | DIA. C<br>INCHES |
|-----------------------|-----------------------|-------------------------|------------------|
| 19                    | 17                    | 1.50                    | 0.625            |
| 57                    | 51                    | 7.00                    | 1.250            |
| 79                    | 73                    | 7.50                    | 1.500            |
| 94                    | 88                    | 8.00                    | 1.750            |
| 121                   | 115                   | 8.50                    | 2.000            |
| 120                   | 114                   | 9.00                    | 2.250            |
| 146                   | 140                   | 9.50                    | 2.500            |



SIDE VIEW

END VIEW

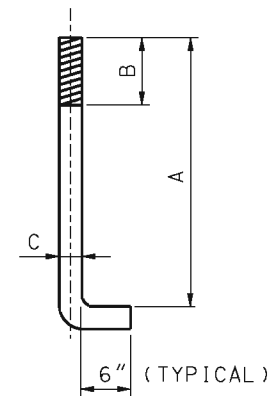
SIDE VIEW

END VIEW

TWO BOLTS PER PLATE  
HEX NUT OR  $\frac{5}{16}$ " FILLET WELD ALL  
AROUND BOTH SIDES

FOUR BOLTS PER PLATE  
HEX NUT OR  $\frac{5}{16}$ " FILLET WELD ALL AROUND BOTH SIDES

OPTIONAL STEEL PLATE FOR ANCHOR BOLTS



ANCHOR BOLT

NOTE:  
ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**TRAFFIC SIGNALS**

**POST BASES**

STATE OF MISSOURI

KATHRYN PHILLIPS HARVEY

NUMBER PE-23751

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

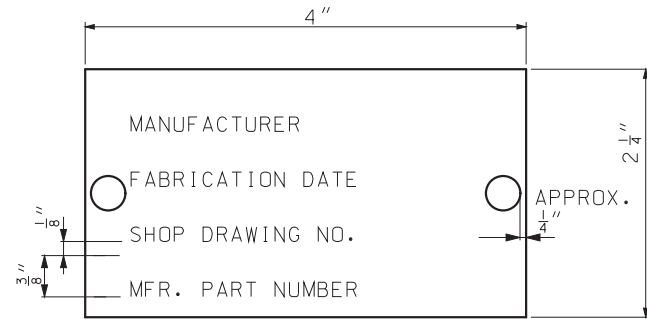
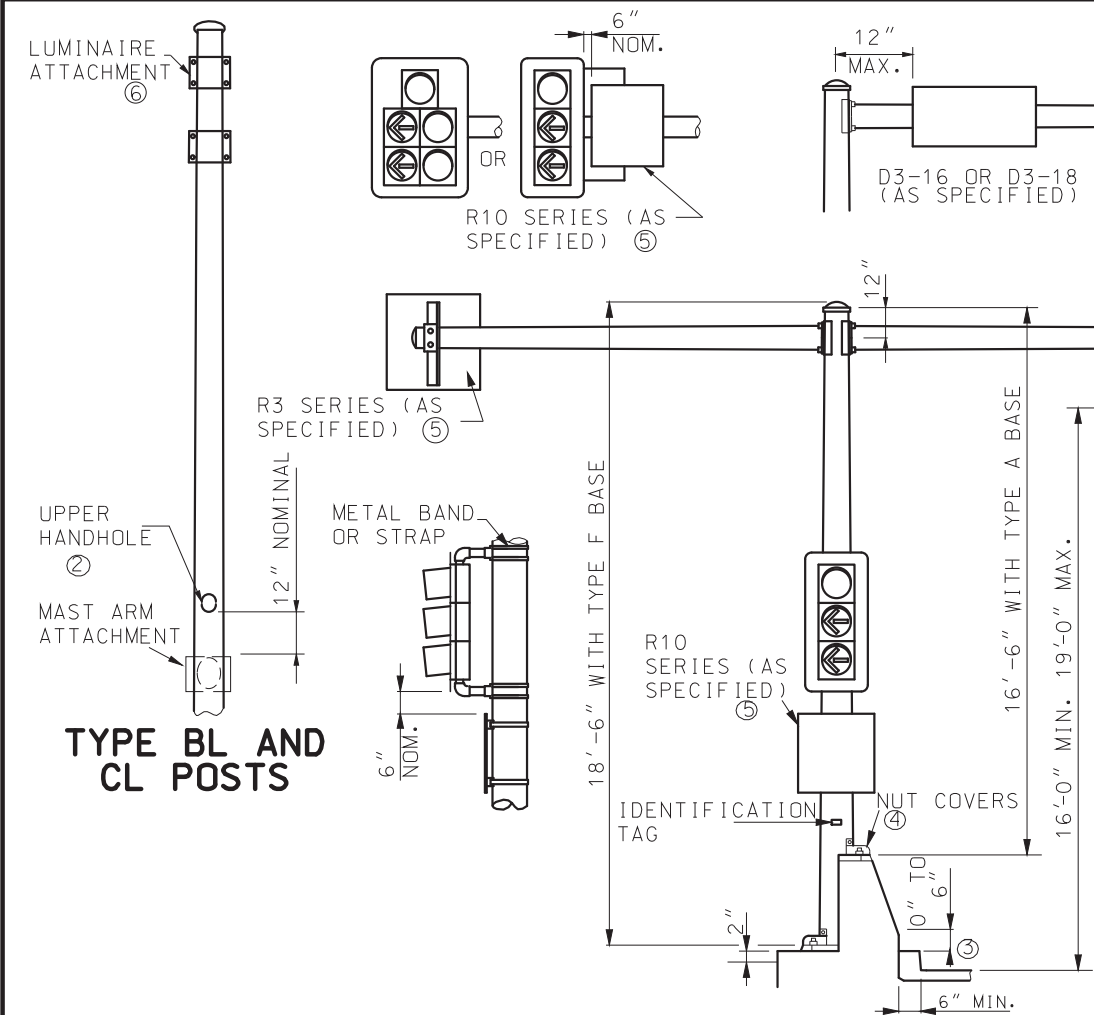
DATE EFFECTIVE: 02/01/2008

DATE PREPARED: 8/26/2009

**902.30P**

SHEET NO.

2 OF 2



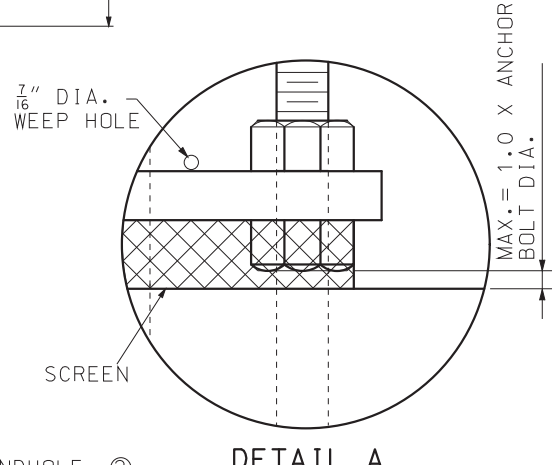
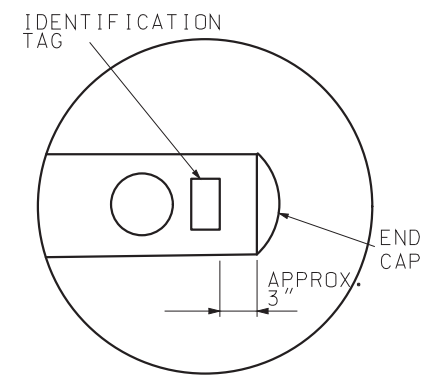
**IDENTIFICATION TAG**

ID TAG NOTE:

TAG SHALL BE ALUMINUM OR STAINLESS STEEL AND ATTACHED TO POLE OR MAST ARM USING TWO RIVETS OR STAINLESS STEEL DRIVE SCREWS. ID TAG HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.

- ARM LENGTHS SHALL NOT EXCEED 55 FEET.
- HANDHOLES SHALL BE APPROXIMATELY 4" x 6 1/2". HANDHOLE FRAME SHALL BE REINFORCED SO THAT THE POLE STRENGTH IS NOT REDUCED.
- 0" TO 6" VARIATION IN BASE HEIGHT IS FOR OBTAINING 16'-0" CLEARANCE. 0.13 C.Y. CONCRETE AND 3 LBS. REINFORCING STEEL PER 6".
- POSTS SHALL BE FURNISHED WITH INDIVIDUAL NUT COVERS.
- NO SIGN IN EXCESS OF 15.0 SQUARE FEET SHALL BE INSTALLED ON POSTS OR MAST ARMS. SIGNS EXCEEDING 8.0 SQUARE FEET SHALL BE LOCATED SO THAT THE EDGE OF THE SIGN IS NO MORE THAN 12" FROM THE CENTERLINE OF THE POST. D3 SERIES SIGNS, AS WELL AS SIGNS INSTALLED ON THE POST, SHALL BE MOUNTED WITH A STRAP TYPE SIGN SUPPORT. R10 SERIES SIGNS INSTALLED ON THE MAST ARM SHALL BE MOUNTED WITH A SIGN BRACKET ASSEMBLY.

- SEE DRAWING 901.00 FOR TYPICAL BRACKET ARM MOUNTING FOR TYPE BL AND TYPE CL POSTS.
- A GALVANIZED SCREEN SHALL BE USED BETWEEN THE POST BASE PLATE AND CONCRETE BASE. SCREENS SHALL BE PRESS-FORMED OF 3 OR 4 MESH, 21 GAGE OR HEAVIER, STAINLESS STEEL OR HOT-DIPPED GALVANIZED WIRE SCREEN OR APPROVED EQUIVALENT, THAT WILL PROVIDE A FRICTION-TIGHT FIT WHEN INSTALLED.
- POST SHALL BE GROUNDED FROM GROUND LUG IN POST WITH # 6 AWG BARE COPPER WIRE TO CONDUIT SYSTEM. GROUND LUG SHALL BE 90° OR 180° FROM THE HANDHOLE.



**GENERAL NOTES:**

ARMS SHALL BE RAKED UP 0.25" PER FOOT MINIMUM. ARMS SHALL BE PROVIDED WITH A PERMANENT MARKING INDICATING PROPER ORIENTATION FOR INSTALLATION.

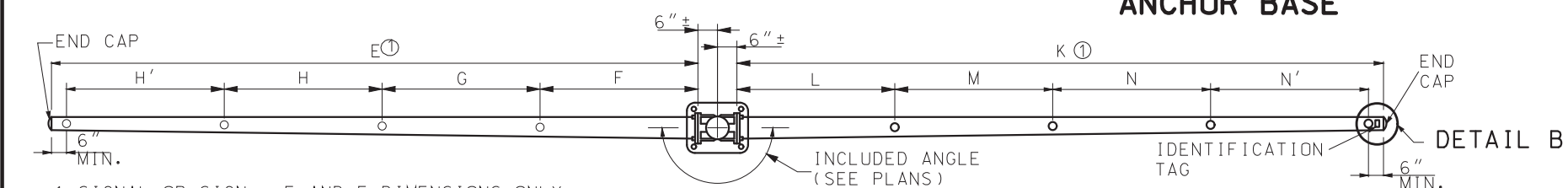
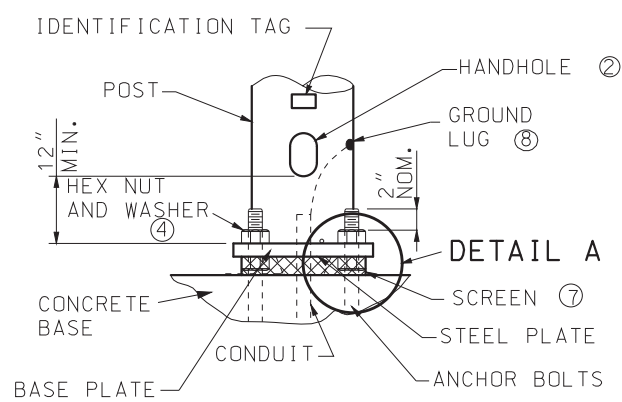
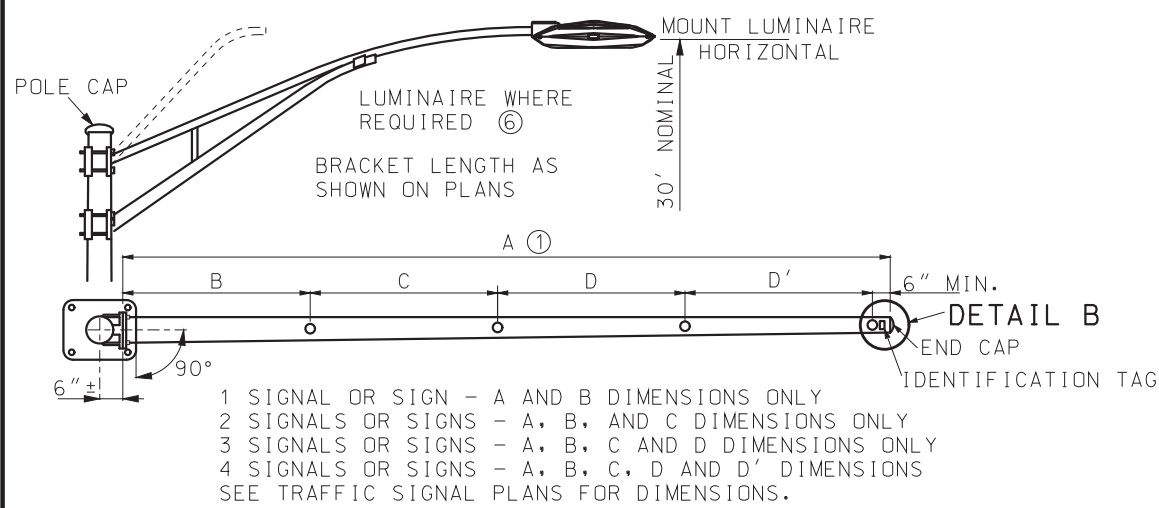
SIGNS AND SIGNALS SHALL BE VERTICAL. SIGNAL HEADS ON MAST ARMS SHALL BE TILTED FORWARD FROM THE TOP 3 TO 7 DEGREES FROM VERTICAL.

IF A SIGN EXCEEDS 42" IN LENGTH, TWO STRAP SUPPORTS ARE REQUIRED: AND IF A SIGN EXCEEDS 96" IN LENGTH, THREE STRAP SUPPORTS ARE REQUIRED.

TO DETERMINE LEFT OR RIGHT ON TYPE B OR C SIGNAL POST, VIEWING POSITION SHALL BE FROM THE CENTER OF THE INTERSECTION BEING CONTROLLED AND FACING THE SIGNAL INVOLVED.

TRAFFIC SIGNALS MOUNTED ON MAST ARMS SHALL BE FURNISHED WITH MOUNTING BRACKETS UTILIZING CABLES.

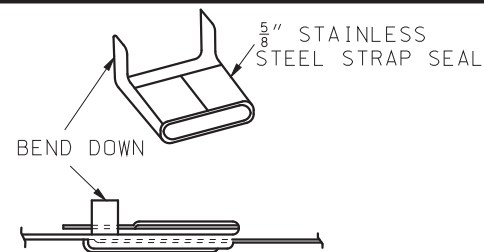
SEE STANDARD 902.30 FOR FOUNDATION AND ANCHOR BOLT DETAILS.



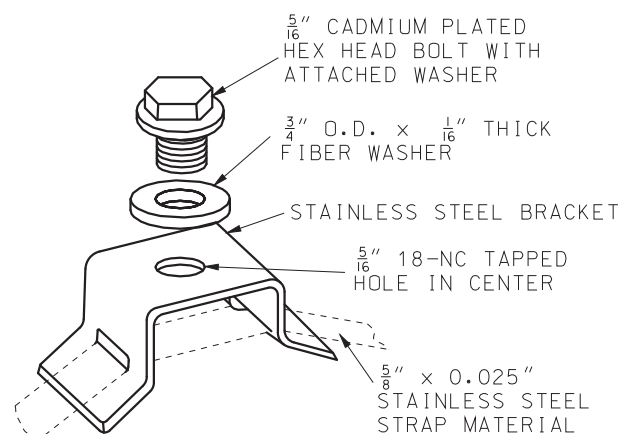
- SIGNAL OR SIGN - K AND L DIMENSIONS ONLY
  - SIGNALS OR SIGNS - K, L, AND M DIMENSIONS ONLY
  - SIGNALS OR SIGNS - K, L, M, AND N DIMENSIONS ONLY
  - SIGNALS OR SIGNS - K, L, M, N AND N' DIMENSIONS
- SEE TRAFFIC SIGNAL PLANS FOR DIMENSIONS

|                                                                                                                                                         |                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                 |
|                                                                                                                                                         | <p><b>TRAFFIC SIGNALS</b></p> <p><b>TUBULAR STEEL POSTS</b></p> |
| <p>DATE EFFECTIVE: 04/01/2018</p> <p>DATE PREPARED: 2/9/2018</p>                                                                                        | <p><b>902.40R</b></p> <p>SHEET NO. 1 OF 3</p>                   |

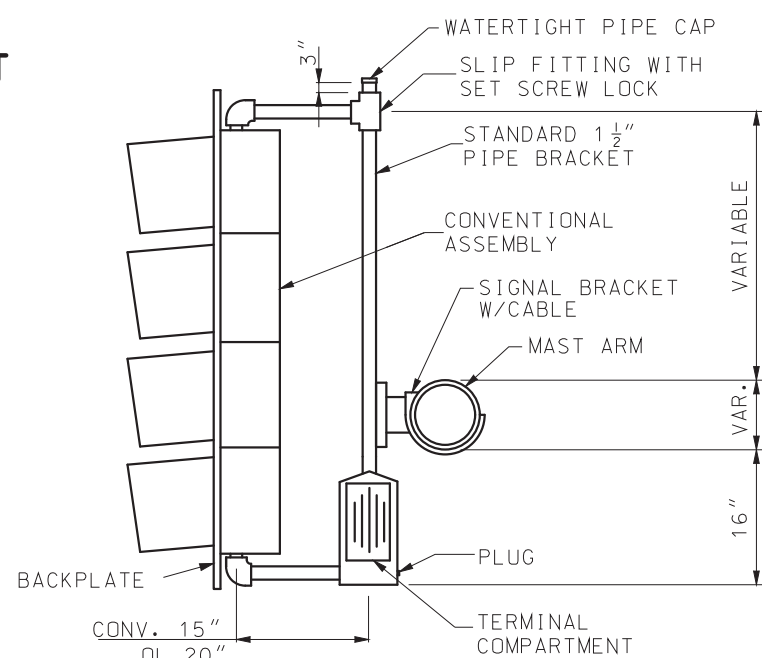
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



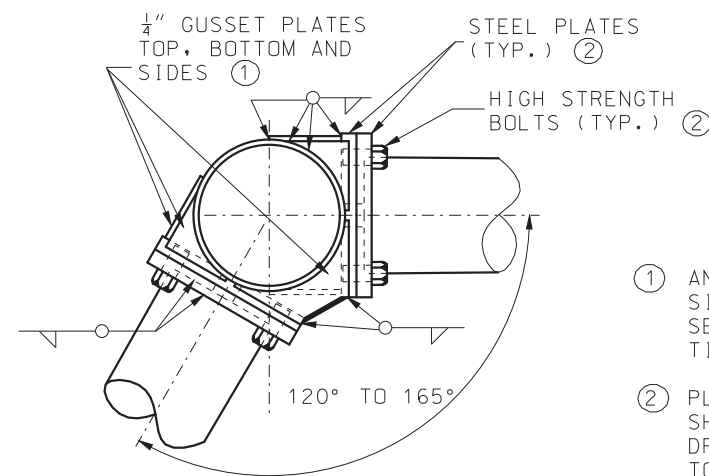
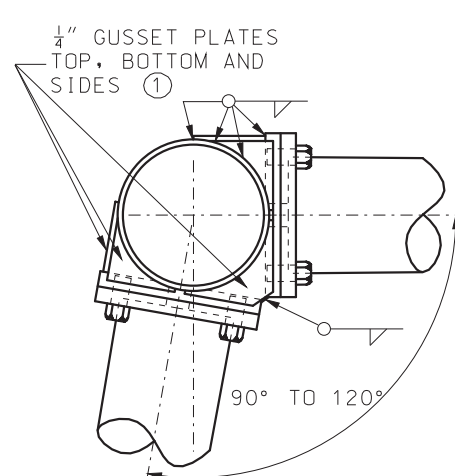
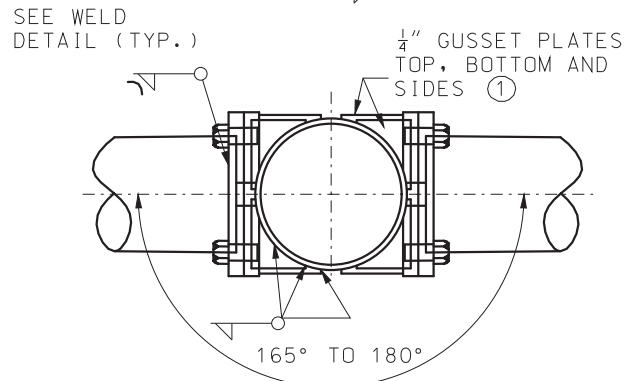
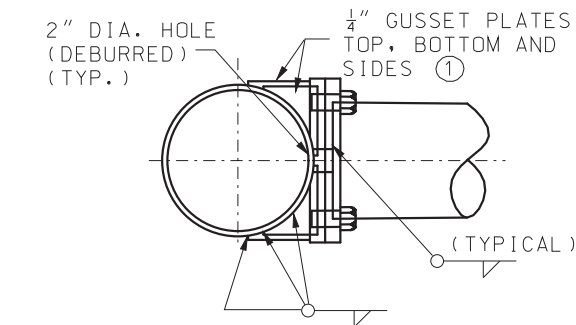
VIEW SHOWING  
ENDS OF STRAP  
CLAMPED IN SEAL



STRAP TYPE  
SIGN SUPPORT

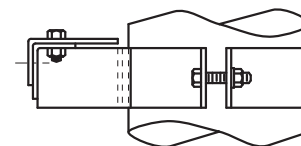


MAST ARM MOUNTED  
SIGNAL HEAD  
(SEE STANDARD 902.00)

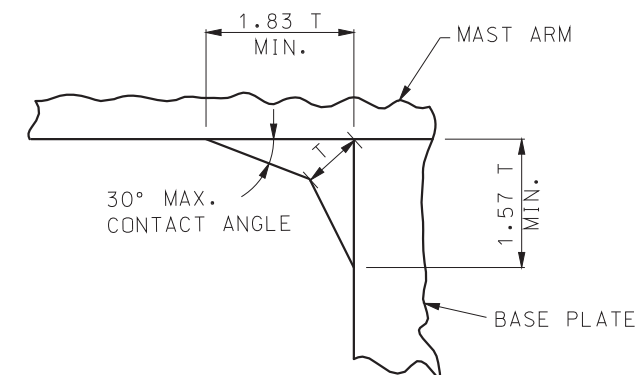


- ① ANY OPENINGS BETWEEN TOP AND SIDE GUSSET PLATES SHALL BE SEALED WITH LIFETIME CAULK AT TIME OF INSTALLATION.
- ② PLATE AND BOLT SIZES SHALL BE SHOWN ON FABRICATORS SHOP DRAWINGS AND SHALL BE SUBJECT TO APPROVAL.

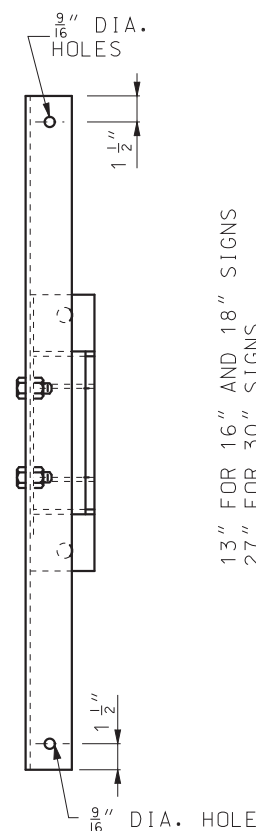
## ARM ATTACHMENTS



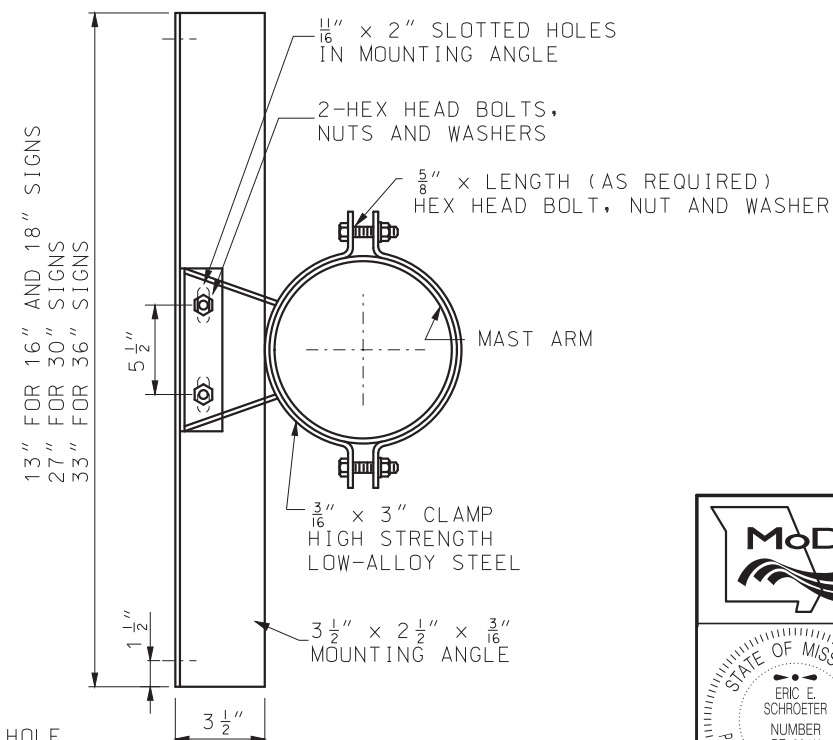
TOP VIEW



WELD DETAIL



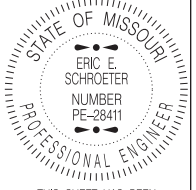
FRONT VIEW



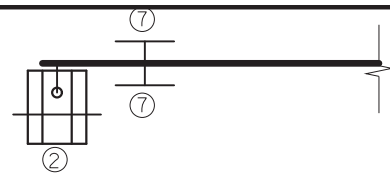
SIDE VIEW

## SIGN BRACKET ASSEMBLY

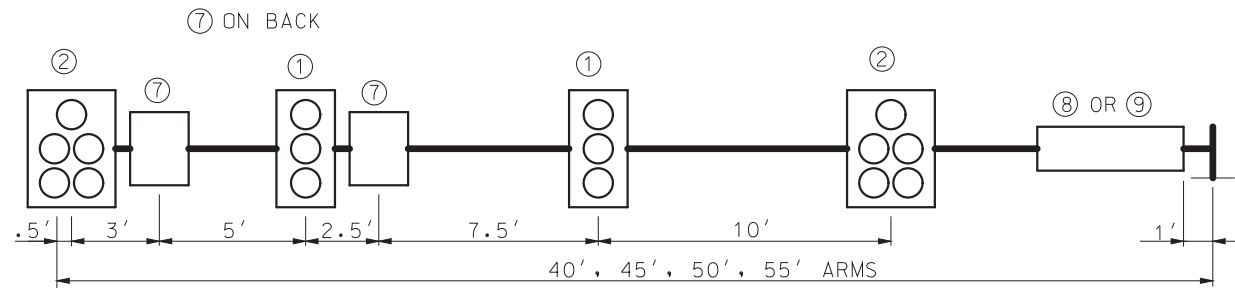
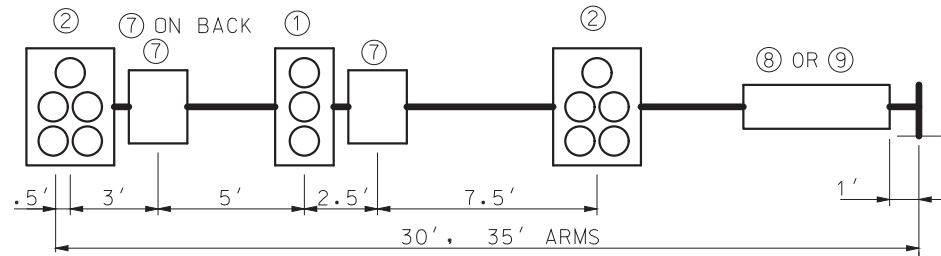
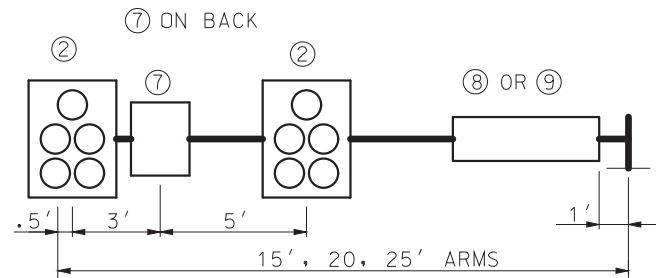
ALTERNATE DESIGN MAY BE PROVIDED  
AS APPROVED BY ENGINEER

|                                                                                                                                              |                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                       |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                       |
|  <b>TRAFFIC SIGNALS</b><br>TUBULAR STEEL POSTS          |                                       |
| DATE EFFECTIVE: 04/01/2018<br>DATE PREPARED: 2/9/2018                                                                                        | <b>902.40R</b><br>SHEET NO.<br>2 OF 3 |

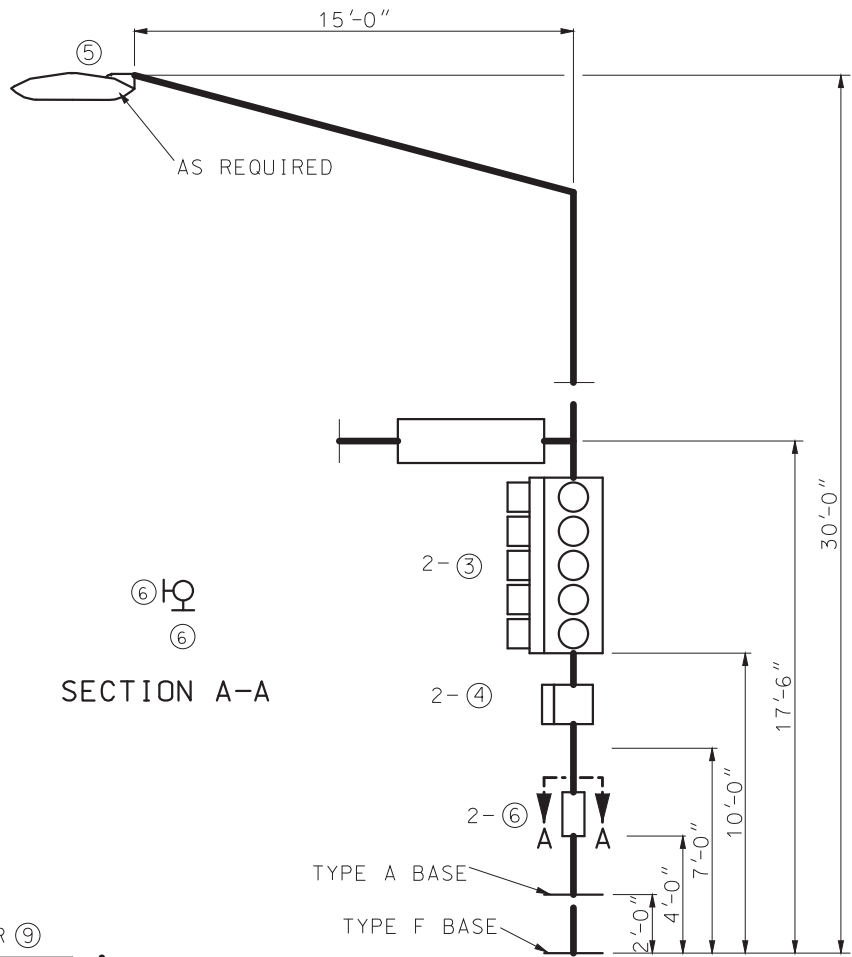




TYPICAL TOP VIEW

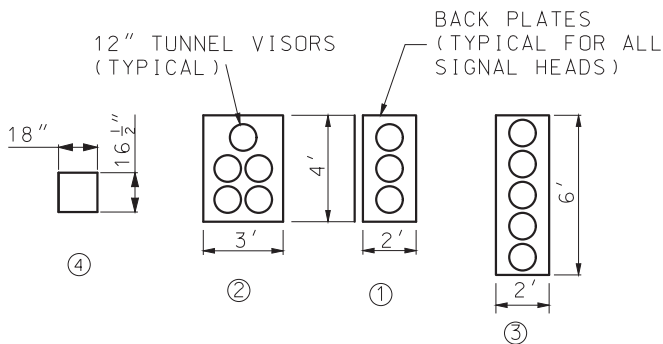


MAST ARM LOADING



SECTION A-A

TYPICAL POST LOADING



MINIMUM DESIGN LOADING FOR POST AND MAST ARM ATTACHMENTS

| ITEM NO. | DESCRIPTION           | WEIGHT (LBS.)* | PROJ. AREA (SQ.FT.) | SURFACE AREA (SQ.FT.) |
|----------|-----------------------|----------------|---------------------|-----------------------|
| ①        | 3-SECTION OL HEAD     | 95.0           | 8.0                 | 32.5                  |
| ②        | 5-SECTION OL HEAD     | 173.0          | 12.0                | 47.5                  |
| ③        | VERT. 5-SECT. OL HEAD | 100.0          | 12.0                | 50.5                  |
| ④        | 1-SECTION PED HEAD    | 15.0           | 2.0                 | XX.X                  |
| ⑤        | LED-A LUMINAIRE       | 30.0           | 1.0                 | 3.5                   |
| ⑥        | 9" X 12" SIGN         | 2.0            | 0.8                 | N/A                   |
| ⑦        | 30" X 36" SIGN        | 13.0           | 7.5                 | N/A                   |
| ⑧        | 120" X 18" SIGN       | 25.0           | 15.0                | N/A                   |
| ⑨        | 96" X 16" SIGN        | 18.0           | 10.7                | N/A                   |
|          | 96" X 18" SIGN        | 20.0           | 12.0                | N/A                   |

OL- OPTICALLY LIMITED  
\* MOUNTING HARDWARE INCLUDED

STRUCTURAL DESIGN REQUIREMENTS:

STRUCTURAL SUPPORTS SHALL BE DESIGNED AND FABRICATED TO WITHSTAND THEIR OWN LOADING AND THE ATTACHMENT LOADING SHOWN ON THIS DRAWING OR ON THE PLANS, WHICHEVER IS GREATER. STRUCTURAL MEMBERS INCLUDE POSTS, MAST ARMS AND LUMINAIRE BRACKET ARMS, AS REQUIRED.

DESIGN OF STRUCTURAL SUPPORTS SHALL BE BASED ON AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS, 1994 OR LATEST REVISION, WITH THESE EXCEPTIONS:

MINIMUM DESIGN WIND SPEED OF 90 MPH AT 30 FEET ABOVE GROUND.

| GROUP LOADING:                  | PERCENT OF ALLOWABLE STRESS (ALL MATERIALS) |
|---------------------------------|---------------------------------------------|
| GROUP I - DL                    | 100                                         |
| GROUP II - DL + W               | 133                                         |
| GROUP III - DL + ICE + 0.5(W**) | 133                                         |

\* NO LOAD REDUCTION FACTORS SHALL BE APPLIED IN CONJUNCTION WITH THESE INCREASED ALLOWABLE STRESSES.  
\*\* W TO BE COMPUTED ON THE BASIS OF THE WIND PRESSURE FORMULA, 25 PSF (1197 Pa) MINIMUM FOR W FOR GROUP III.

FOR TYPE B AND BL POSTS, ICE AND DEAD LOADING SHALL BE BASED ON THE COMBINED EFFECT OF DESIGN LOADING ON EACH ARM. WIND LOADING IS APPLIED AS DESCRIBED IN SECTION 1.2.5(5)(b) OF THE STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS, 1994 REVISION.

GENERAL NOTES:

ATTACHMENT LOCATIONS ARE FOR STRUCTURAL DESIGN PURPOSES ONLY. ACTUAL LOCATIONS ARE SHOWN ON THE PLANS.

LUMINAIRE PER MODOT'S STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED ON PLANS.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

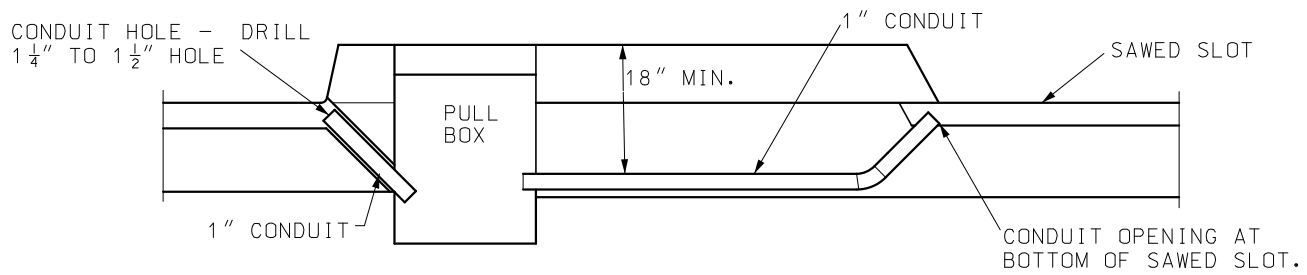
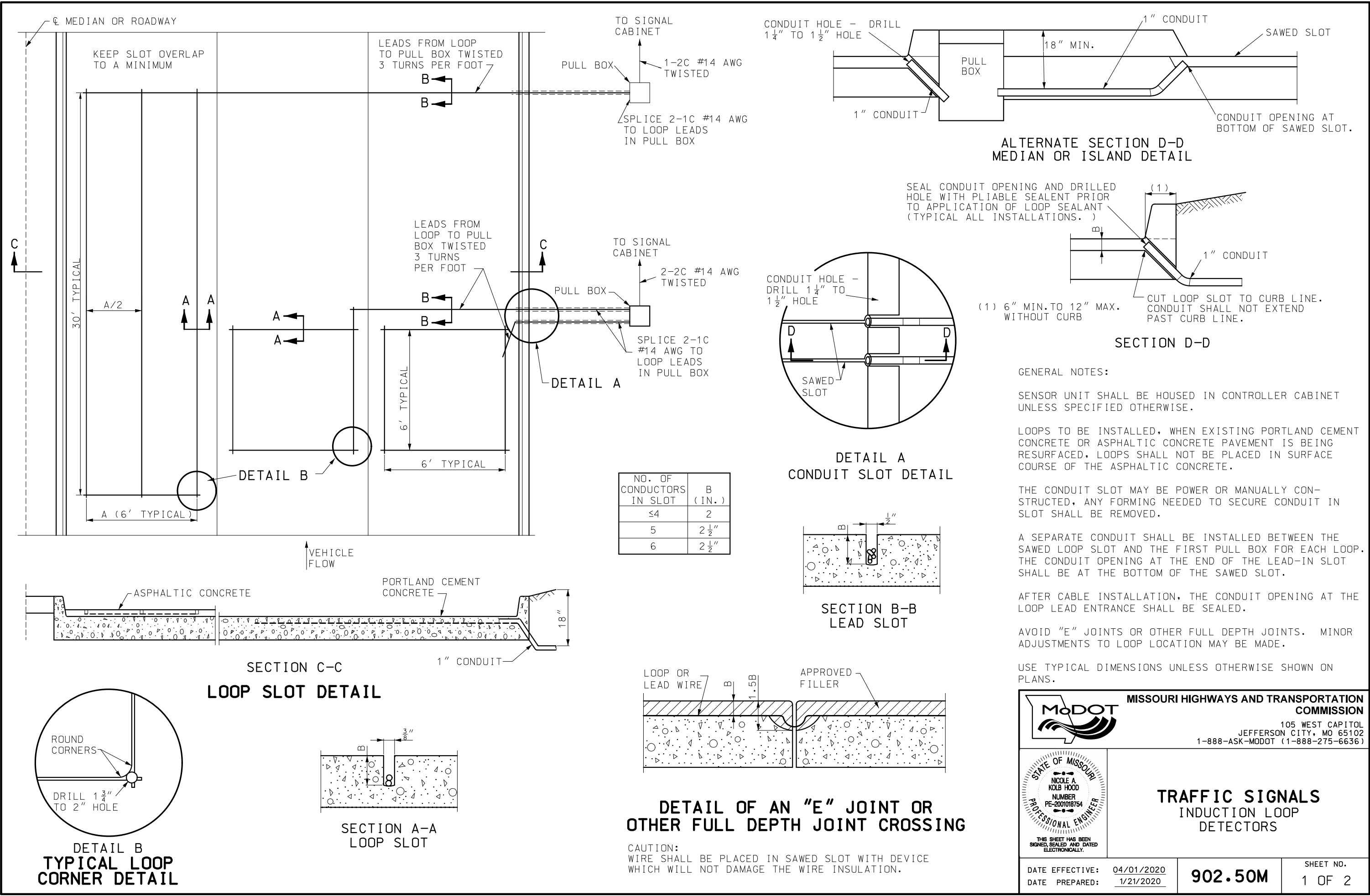
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**TRAFFIC SIGNALS**  
TUBULAR STEEL POSTS  
DESIGN LOADING REQUIREMENTS

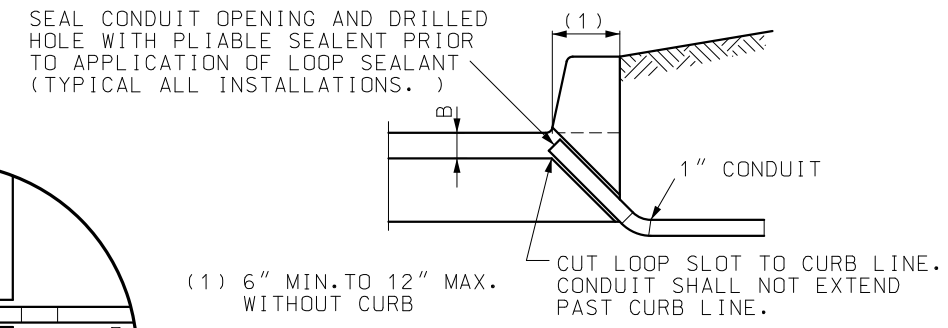
DATE EFFECTIVE: 04/01/2018  
DATE PREPARED: 2/9/2018

**902.40R**

SHEET NO.  
3 OF 3



ALTERNATE SECTION D-D  
MEDIAN OR ISLAND DETAIL



SECTION D-D

GENERAL NOTES:  
SENSOR UNIT SHALL BE HOUSED IN CONTROLLER CABINET UNLESS SPECIFIED OTHERWISE.

LOOPS TO BE INSTALLED, WHEN EXISTING PORTLAND CEMENT CONCRETE OR ASPHALTIC CONCRETE PAVEMENT IS BEING RESURFACED, LOOPS SHALL NOT BE PLACED IN SURFACE COURSE OF THE ASPHALTIC CONCRETE.

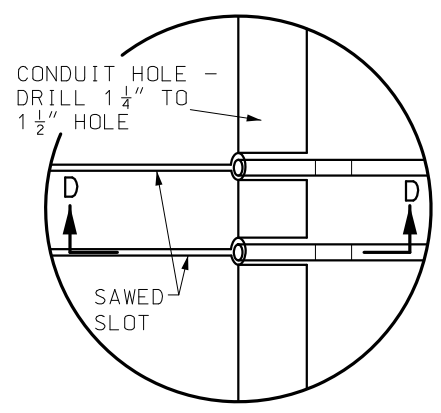
THE CONDUIT SLOT MAY BE POWER OR MANUALLY CON-STRUCTED, ANY FORMING NEEDED TO SECURE CONDUIT IN SLOT SHALL BE REMOVED.

A SEPARATE CONDUIT SHALL BE INSTALLED BETWEEN THE SAWED LOOP SLOT AND THE FIRST PULL BOX FOR EACH LOOP. THE CONDUIT OPENING AT THE END OF THE LEAD-IN SLOT SHALL BE AT THE BOTTOM OF THE SAWED SLOT.

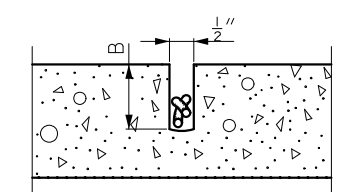
AFTER CABLE INSTALLATION, THE CONDUIT OPENING AT THE LOOP LEAD ENTRANCE SHALL BE SEALED.

AVOID "E" JOINTS OR OTHER FULL DEPTH JOINTS. MINOR ADJUSTMENTS TO LOOP LOCATION MAY BE MADE.

USE TYPICAL DIMENSIONS UNLESS OTHERWISE SHOWN ON PLANS.

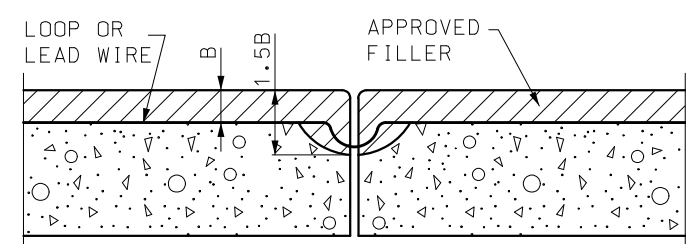


DETAIL A  
CONDUIT SLOT DETAIL



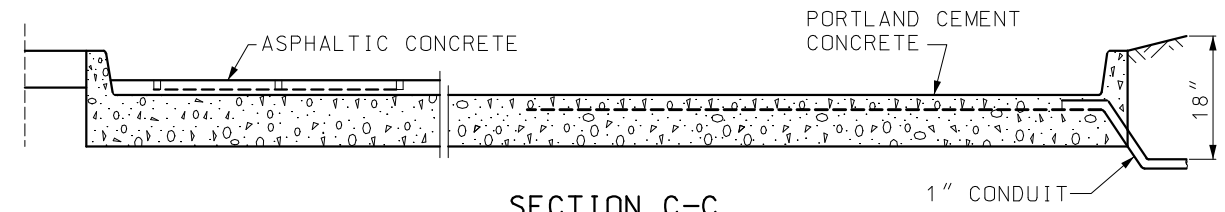
SECTION B-B  
LEAD SLOT

| NO. OF CONDUCTORS IN SLOT | B (IN.) |
|---------------------------|---------|
| ≤4                        | 2       |
| 5                         | 2 1/2   |
| 6                         | 2 1/2   |

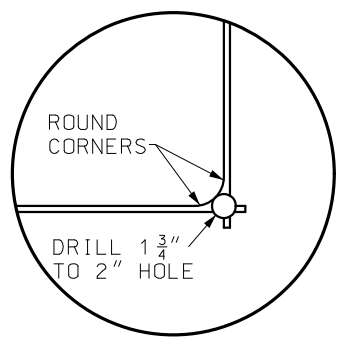


DETAIL OF AN "E" JOINT OR  
OTHER FULL DEPTH JOINT CROSSING

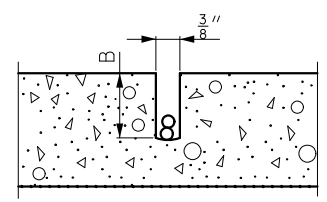
CAUTION:  
WIRE SHALL BE PLACED IN SAWED SLOT WITH DEVICE WHICH WILL NOT DAMAGE THE WIRE INSULATION.



SECTION C-C  
LOOP SLOT DETAIL



DETAIL B  
TYPICAL LOOP  
CORNER DETAIL



SECTION A-A  
LOOP SLOT

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

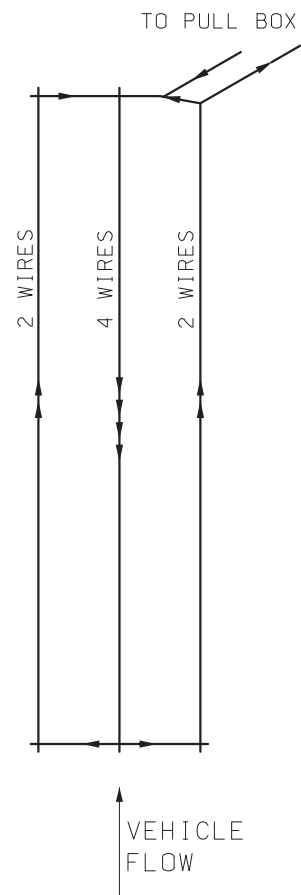
**TRAFFIC SIGNALS  
INDUCTION LOOP  
DETECTORS**

DATE EFFECTIVE: 04/01/2020  
DATE PREPARED: 1/21/2020

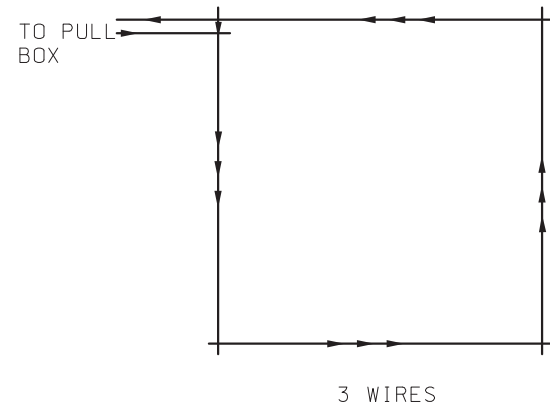
**902.50M**

SHEET NO.  
1 OF 2

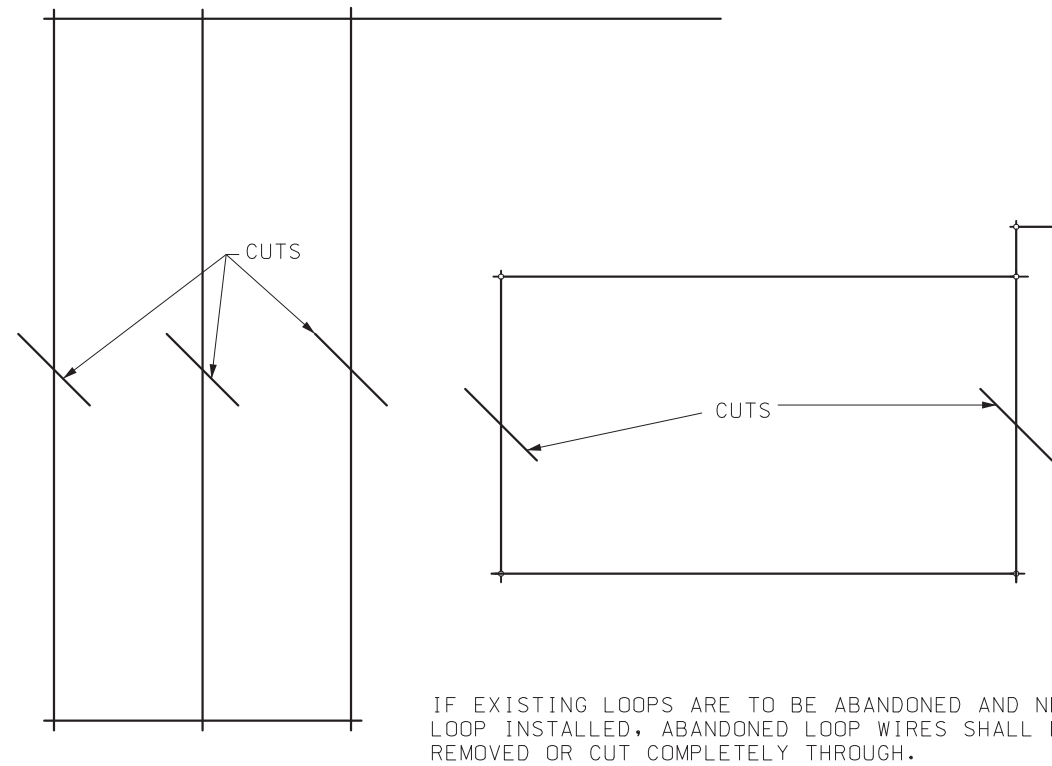




LOOP SHALL BE #14 AWG STRANDED WIRE IN PVC DUCT MADE UP OF 2 NON-TWISTED TURNS IN SINGLE SLOT OR AS RECOMMENDED BY MANUFACTURER OF THE DETECTOR AMPLIFIER. LOOP SHALL BE PLACED IN SAWED SLOTS IN A FIGURE EIGHT MANNER.

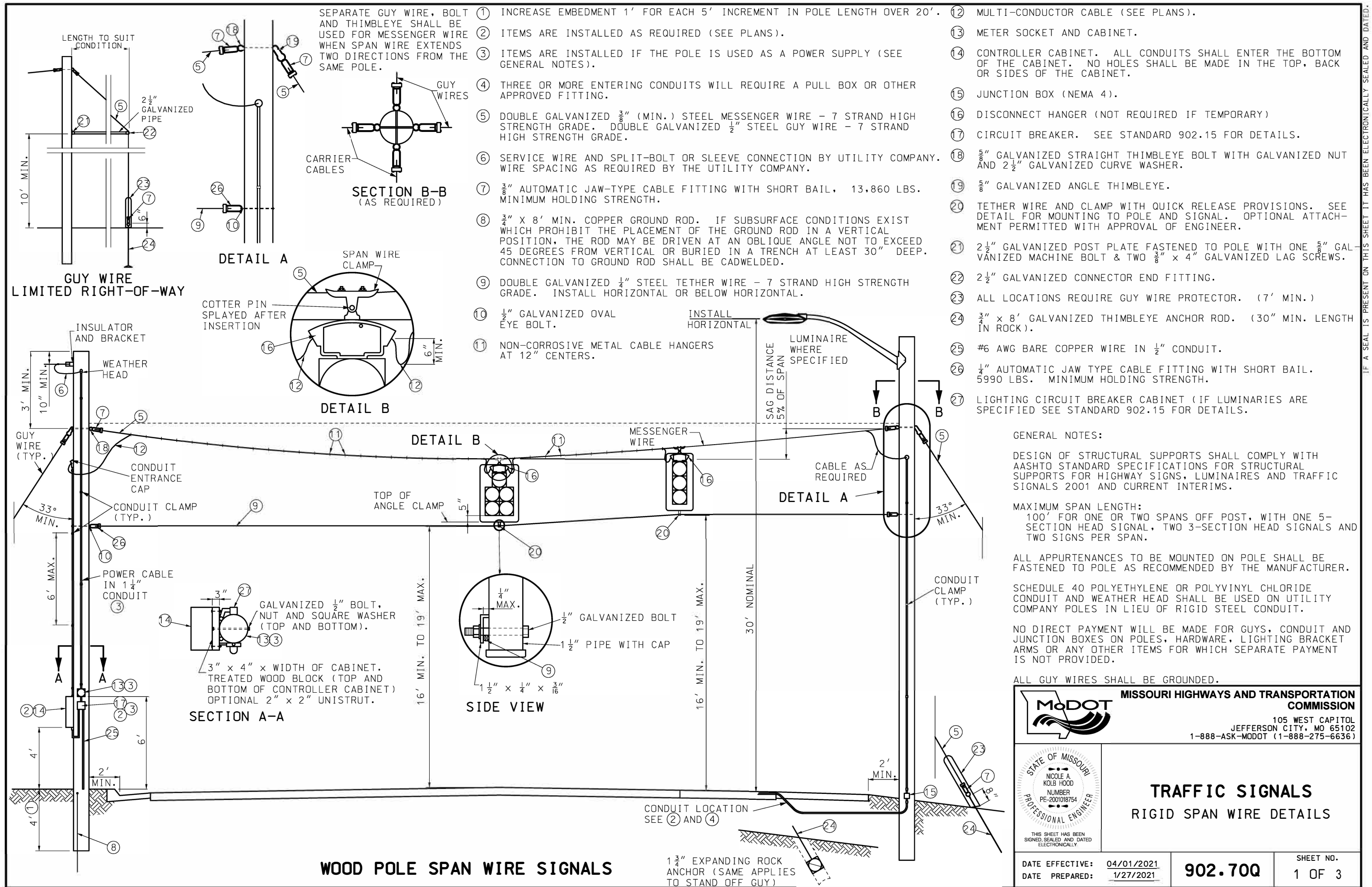


## LOOP CONFIGURATION



## ABANDONED LOOPS

|                                                                                       |  |                                                                                  |                     |
|---------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------|---------------------|
|  |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |                     |
|                                                                                       |  | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                     |
|  |  | <b>TRAFFIC SIGNALS</b><br>INDUCTION LOOP<br>DETECTORS                            |                     |
| DATE EFFECTIVE: 01/01/2020<br>DATE PREPARED: 10/17/2019                               |  | <b>902.50M</b>                                                                   | SHEET NO.<br>2 OF 2 |



IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

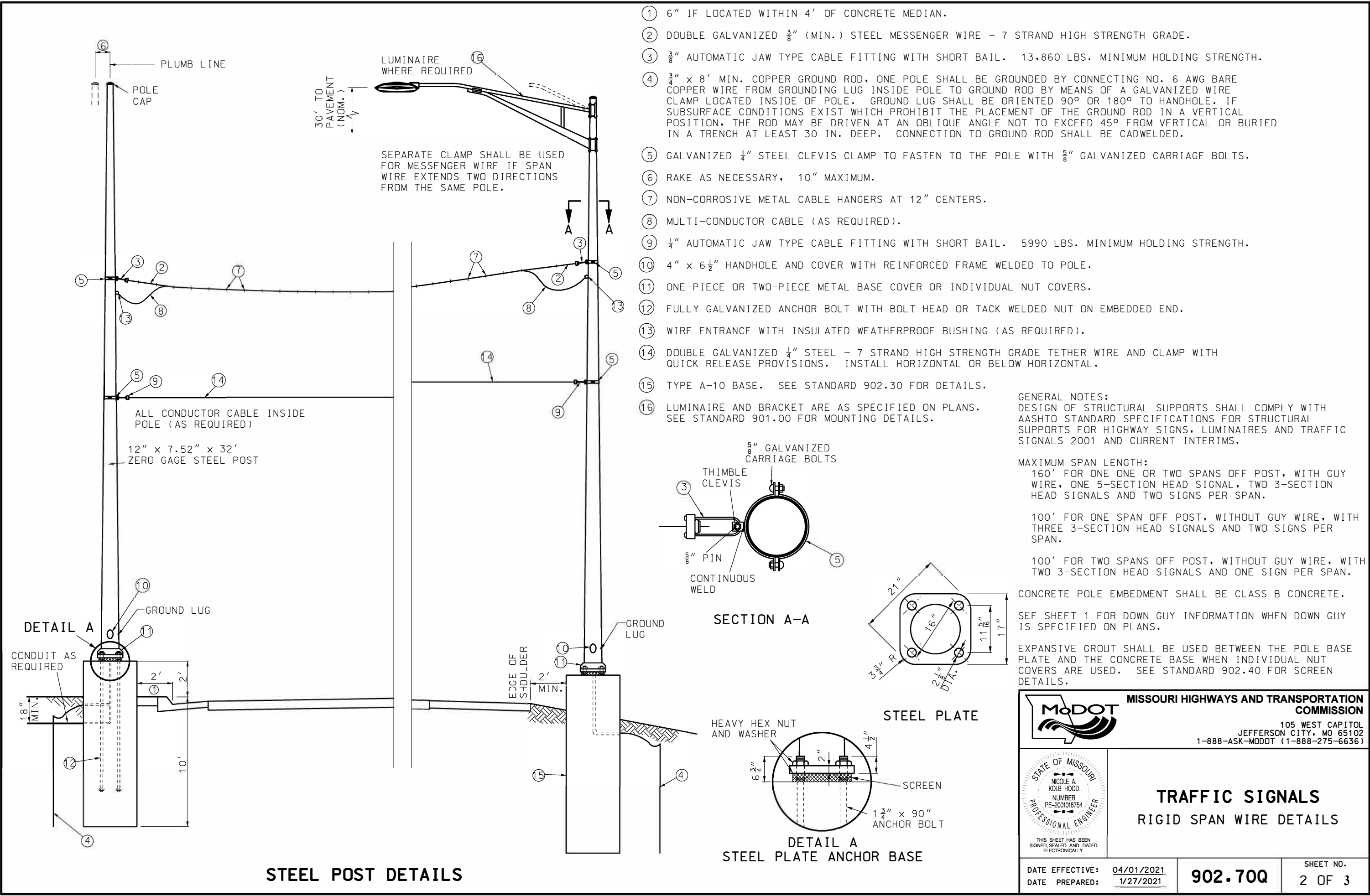
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI  
NICOLE A. KOLB HOOD  
NUMBER PE-2001018754  
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY

**TRAFFIC SIGNALS  
RIGID SPAN WIRE DETAILS**

|                            |                |                     |
|----------------------------|----------------|---------------------|
| DATE EFFECTIVE: 04/01/2021 | <b>902.70Q</b> | SHEET NO.<br>1 OF 3 |
| DATE PREPARED: 1/27/2021   |                |                     |



- ① 6" IF LOCATED WITHIN 4' OF CONCRETE MEDIAN.
- ② DOUBLE GALVANIZED  $\frac{3}{8}$ " (MIN.) STEEL MESSENGER WIRE - 7 STRAND HIGH STRENGTH GRADE.
- ③  $\frac{3}{8}$ " AUTOMATIC JAW TYPE CABLE FITTING WITH SHORT BAIL. 13,860 LBS. MINIMUM HOLDING STRENGTH.
- ④  $\frac{3}{4}$ " x 8' MIN. COPPER GROUND ROD. ONE POLE SHALL BE GROUNDED BY CONNECTING NO. 6 AWG BARE COPPER WIRE FROM GROUNDING LUG INSIDE POLE TO GROUND ROD BY MEANS OF A GALVANIZED WIRE CLAMP LOCATED INSIDE OF POLE. GROUND LUG SHALL BE ORIENTED 90° OR 180° TO HANDHOLE. IF SUBSURFACE CONDITIONS EXIST WHICH PROHIBIT THE PLACEMENT OF THE GROUND ROD IN A VERTICAL POSITION, THE ROD MAY BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45° FROM VERTICAL OR BURIED IN A TRENCH AT LEAST 30 IN. DEEP. CONNECTION TO GROUND ROD SHALL BE CADWELDED.
- ⑤ GALVANIZED  $\frac{1}{4}$ " STEEL CLEVIS CLAMP TO FASTEN TO THE POLE WITH  $\frac{5}{8}$ " GALVANIZED CARRIAGE BOLTS.
- ⑥ RAKE AS NECESSARY, 10" MAXIMUM.
- ⑦ NON-CORROSIVE METAL CABLE HANGERS AT 12" CENTERS.
- ⑧ MULTI-CONDUCTOR CABLE (AS REQUIRED).
- ⑨  $\frac{1}{4}$ " AUTOMATIC JAW TYPE CABLE FITTING WITH SHORT BAIL. 5990 LBS. MINIMUM HOLDING STRENGTH.
- ⑩ 4" x 6  $\frac{1}{2}$ " HANDHOLE AND COVER WITH REINFORCED FRAME WELDED TO POLE.
- ⑪ ONE-PIECE OR TWO-PIECE METAL BASE COVER OR INDIVIDUAL NUT COVERS.
- ⑫ FULLY GALVANIZED ANCHOR BOLT WITH BOLT HEAD OR TACK WELDED NUT ON EMBEDDED END.
- ⑬ WIRE ENTRANCE WITH INSULATED WEATHERPROOF BUSHING (AS REQUIRED).
- ⑭ DOUBLE GALVANIZED  $\frac{1}{4}$ " STEEL - 7 STRAND HIGH STRENGTH GRADE TETHER WIRE AND CLAMP WITH QUICK RELEASE PROVISIONS. INSTALL HORIZONTAL OR BELOW HORIZONTAL.
- ⑮ TYPE A-10 BASE. SEE STANDARD 902.30 FOR DETAILS.
- ⑯ LUMINAIRE AND BRACKET ARE AS SPECIFIED ON PLANS. SEE STANDARD 901.00 FOR MOUNTING DETAILS.

GENERAL NOTES:  
DESIGN OF STRUCTURAL SUPPORTS SHALL COMPLY WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS 2001 AND CURRENT INTERIMS.

MAXIMUM SPAN LENGTH:  
160' FOR ONE ONE OR TWO SPANS OFF POST, WITH GUY WIRE, ONE 5-SECTION HEAD SIGNAL, TWO 3-SECTION HEAD SIGNALS AND TWO SIGNS PER SPAN.

100' FOR ONE SPAN OFF POST, WITHOUT GUY WIRE, WITH THREE 3-SECTION HEAD SIGNALS AND TWO SIGNS PER SPAN.

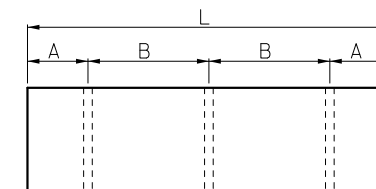
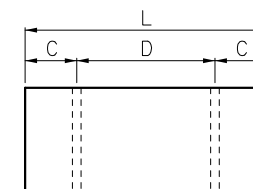
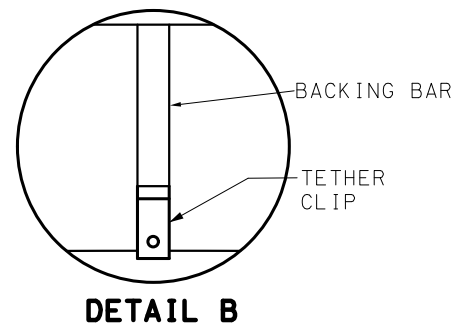
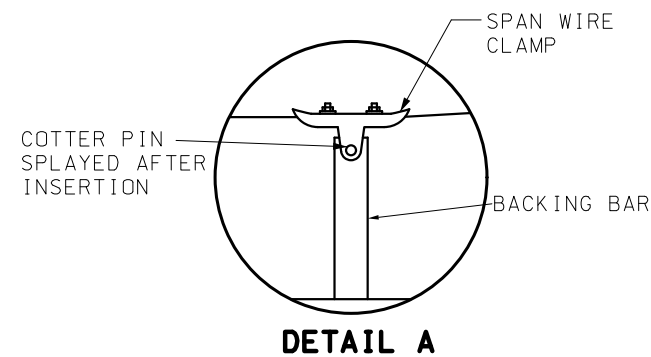
100' FOR TWO SPANS OFF POST, WITHOUT GUY WIRE, WITH TWO 3-SECTION HEAD SIGNALS AND ONE SIGN PER SPAN.

CONCRETE POLE EMBEDMENT SHALL BE CLASS B CONCRETE.

SEE SHEET 1 FOR DOWN GUY INFORMATION WHEN DOWN GUY IS SPECIFIED ON PLANS.

EXPANSIVE GROUT SHALL BE USED BETWEEN THE POLE BASE PLATE AND THE CONCRETE BASE WHEN INDIVIDUAL NUT COVERS ARE USED. SEE STANDARD 902.40 FOR SCREEN DETAILS.

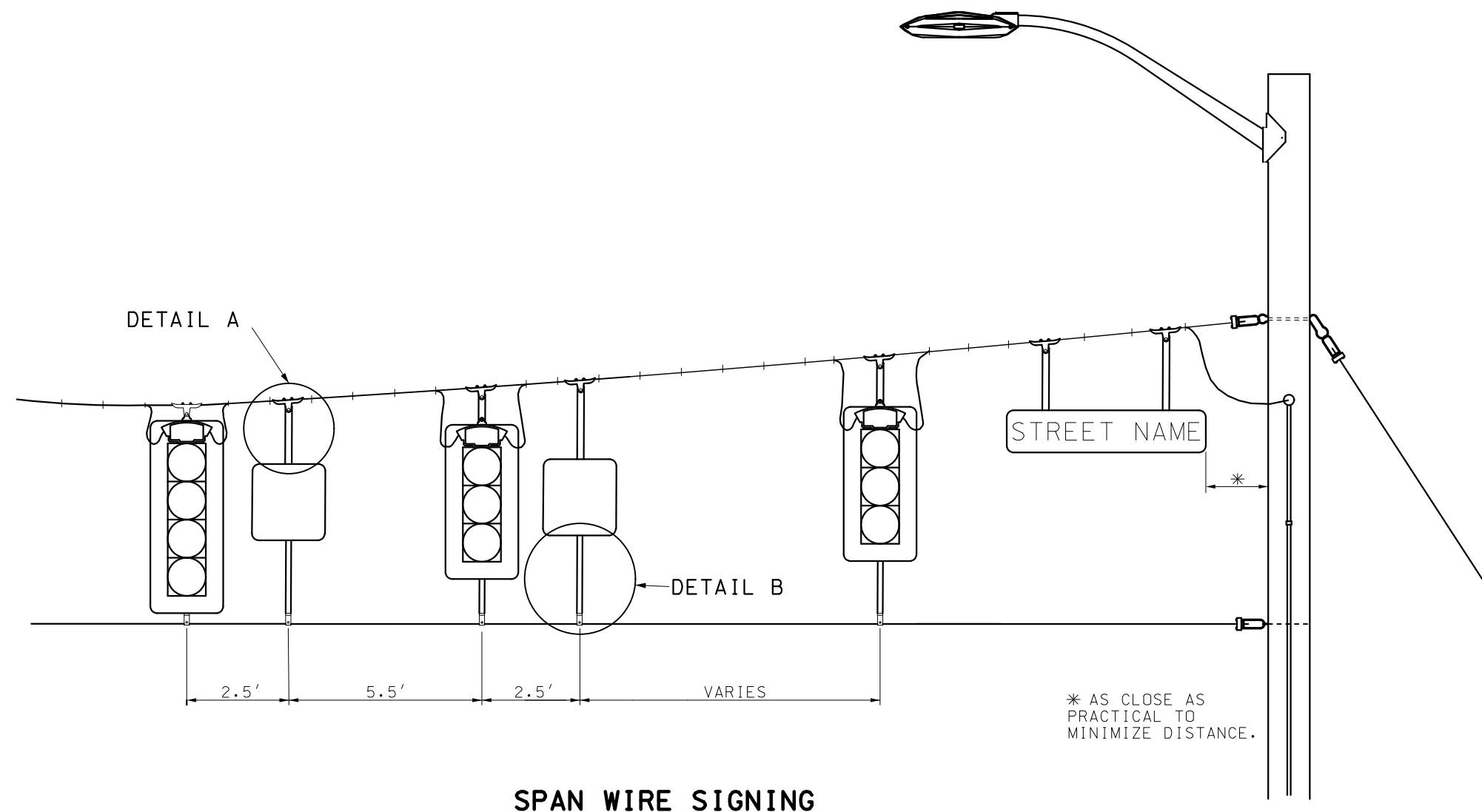
|                                                                                                                                              |                                                                   |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                                                   |                     |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                                                   |                     |
|                                                         | <b>TRAFFIC SIGNALS</b><br><b>RIGID SPAN WIRE DETAILS</b>          |                     |
|                                                                                                                                              | THIS SHEET HAS BEEN<br>SIGNED, SEALED AND DATED<br>ELECTRONICALLY |                     |
| DATE EFFECTIVE: 04/01/2021<br>DATE PREPARED: 1/27/2021                                                                                       | <b>902.70Q</b>                                                    | SHEET NO.<br>2 OF 3 |



$$A = 1/6(L) \quad C = 1/5(L)$$

$$B = 1/3(L) \quad D = 3/5(L)$$

## BACKING BAR PLACEMENT



### GENERAL NOTES:

SIGNS UP TO 30" IN WIDTH SHALL BE INSTALLED ON ONE VERTICAL BACKING BAR. SIGNS 30" TO 60" IN WIDTH SHALL BE INSTALLED ON TWO VERTICAL BACKING BARS. SIGNS WIDER THAN 60" SHALL BE INSTALLED ON THREE VERTICAL BACKING BARS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

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SIGNED, SEALED AND DATED  
ELECTRONICALLY.

## TRAFFIC SIGNALS

### RIGID SPAN WIRE SIGN DETAILS

DATE EFFECTIVE: 01/01/2022  
DATE PREPARED: 10/21/2021

**902.70Q**

SHEET NO.  
3 OF 3

|  |                                                              |
|--|--------------------------------------------------------------|
|  | OPTICALLY LIMITING SIGNAL HEAD WITH BACKPLATE                |
|  | OPTICALLY LIMITING & CONVENTIONAL SIGNAL HEAD WITH BACKPLATE |
|  | CONVENTIONAL SIGNAL HEAD WITH BACKPLATE                      |
|  | SIGNAL HEAD - PEDESTRIAN                                     |
|  | POST MOUNTED SIGNAL HEAD WITH SIGN AND BACKPLATE             |
|  | STOP LINE                                                    |
|  | LANE USE                                                     |
|  | TYPE A BASE                                                  |
|  | TYPE F BASE                                                  |
|  | TYPE C BASE                                                  |
|  | EXISTING POST BASE                                           |
|  | WOOD POLE WITH DOWN GUY                                      |
|  | STEEL POLE                                                   |
|  | STEEL POLE WITH DOWN GUY                                     |
|  | CONTROLLER WITH PAD                                          |
|  | EXISTING CONTROLLER                                          |
|  | PULL BOX, TYPE I DRAIN, CONCRETE                             |
|  | PULL BOX, TYPE II DRAIN, CONCRETE                            |
|  | PULL BOX, TYPE I DRAIN, PREFORMED                            |
|  | PULL BOX, TYPE II DRAIN, PREFORMED                           |
|  | DOUBLE PULL BOX, TYPE A, TYPE I DRAIN, CONCRETE              |
|  | DOUBLE PULL BOX, TYPE A, TYPE II DRAIN, CONCRETE             |
|  | DOUBLE PULL BOX, TYPE B, TYPE I DRAIN                        |
|  | DOUBLE PULL BOX, TYPE B, TYPE II DRAIN                       |
|  | PULL BOX, CLASS 5, TYPE I DRAIN, PREFORMED                   |
|  | PULL BOX, CLASS 5, TYPE II DRAIN, PREFORMED                  |

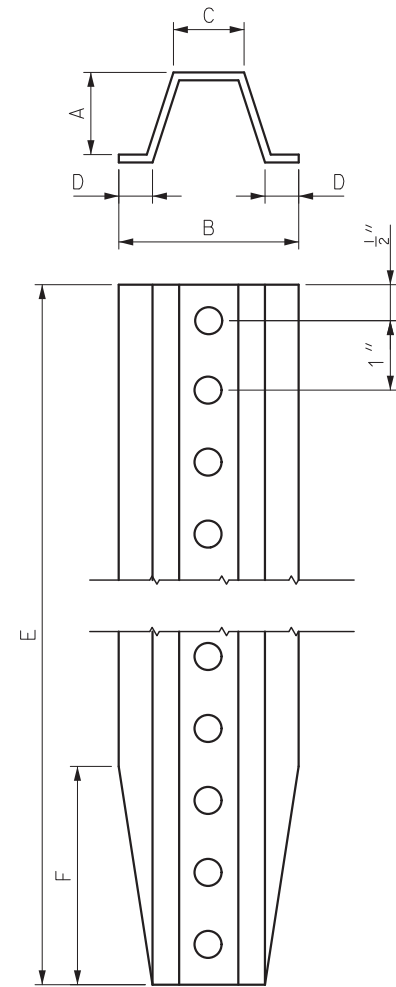
|  |                                                  |
|--|--------------------------------------------------|
|  | EXISTING PULL BOX                                |
|  | SERVICE POLE OR PEDESTAL AND POWER SUPPLY        |
|  | EXISTING SERVICE POLE                            |
|  | LED - A LUMINAIRE                                |
|  | SPAN WIRE WITH SIGNAL HEAD                       |
|  | MAST ARM WITH SIGNAL HEADS AND LED - A LUMINAIRE |
|  | MAST ARM WITH OVERHEAD SIGN                      |
|  | INDUCTION LOOP DETECTOR                          |
|  | VIDEO DETECTION ZONE                             |
|  | PUSH BUTTON DETECTOR                             |
|  | CAPPED RIGID CONDUIT                             |
|  | RIGID CONDUIT IN TRENCH                          |
|  | RIGID CONDUIT PUSHED                             |
|  | EXISTING RIGID CONDUIT                           |
|  | RIGID CONDUIT ON BRIDGE                          |
|  | RIGID CONDUIT IN MEDIAN                          |
|  | SIZE OF CONDUIT                                  |
|  | NUMBER & AWG SIZE OF CABLE                       |
|  | SIGNAL FACE NUMBER                               |
|  | POST NUMBER                                      |
|  | DETECTOR NUMBER                                  |
|  | PULL BOX NUMBER                                  |
|  | WALK INTERVAL                                    |
|  | DON'T WALK INTERVAL                              |
|  | FLASHING DON'T WALK INTERVAL                     |

|     |                             |
|-----|-----------------------------|
| R   | RED (CIRCULAR)              |
| FR  | FLASHING RED (CIRCULAR)     |
| RL  | RED LEFT ARROW              |
| Y   | YELLOW (CIRCULAR)           |
| FY  | FLASHING YELLOW (CIRCULAR)  |
| FYA | FLASHING YELLOW ARROW       |
| FYL | FLASHING YELLOW LEFT ARROW  |
| FYR | FLASHING YELLOW RIGHT ARROW |
| YL  | YELLOW LEFT ARROW           |
| YR+ | YELLOW RIGHT ARROW          |
| G   | GREEN (CIRCULAR)            |
| S   | GREEN STRAIGHT ARROW        |
| L   | GREEN LEFT ARROW            |
| R+  | GREEN RIGHT ARROW           |
|     | TUNNEL VISOR WITH LOUVER    |

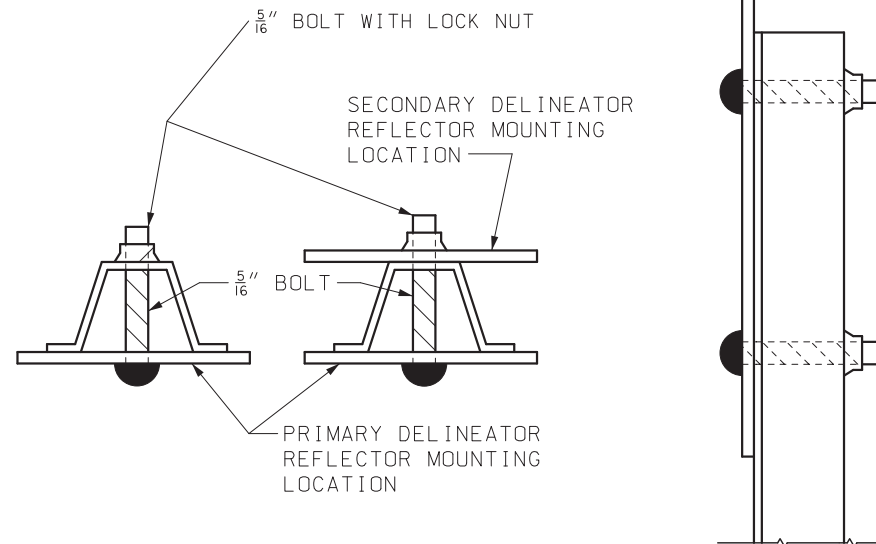
ALL 12 INCH WITH TUNNEL VISOR

| SIGN      | LEGEND                                |
|-----------|---------------------------------------|
| R10 - 10L | LEFT TURN SIGNAL                      |
| R10 - 10R | RIGHT TURN SIGNAL                     |
| R3 - 5L   | LEFT ARROW (SYMBOL) ONLY              |
| R3 - 5R   | RIGHT ARROW (SYMBOL) ONLY             |
| R3 - 5A   | STRAIGHT ARROW (SYMBOL) ONLY          |
| R3 - 6L   | LEFT ARROW - STRAIGHT ARROW (SYMBOL)  |
| R3 - 6R   | RIGHT ARROW - STRAIGHT ARROW (SYMBOL) |
| R3 - 2    | NO LEFT TURN (SYMBOL)                 |
| R3 - 1    | NO RIGHT TURN (SYMBOL)                |
| R3 - 3    | NO TURNS                              |
| D3 - 1    | STREET NAME (ONE LINE)                |
| D3 - 1B   | STREET NAME (TWO LINE)                |
| R10 - 3E  | CROSSWALK (PEDESTRIAN SYMBOL)         |
| R10 - 11A | NO TURN ON RED                        |
| R10 - 13  | EMERGENCY SIGNAL                      |
| R10 - 27A | LEFT TURN YIELD ON FLASHING ARROW     |

|                                                                                                                                            |                                                         |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------|
| <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                         |                            |
|                                                                                                                                            | <b>TRAFFIC SIGNALS</b><br><b>TRAFFIC SIGNAL SYMBOLS</b> |                            |
|                                                                                                                                            |                                                         |                            |
| DATE EFFECTIVE: 04/01/2020<br>DATE PREPARED: 1/21/2020                                                                                     | <b>902.80L</b>                                          | SHEET NO.<br><b>1 OF 1</b> |



GROUND MOUNT  
U-CHANNEL



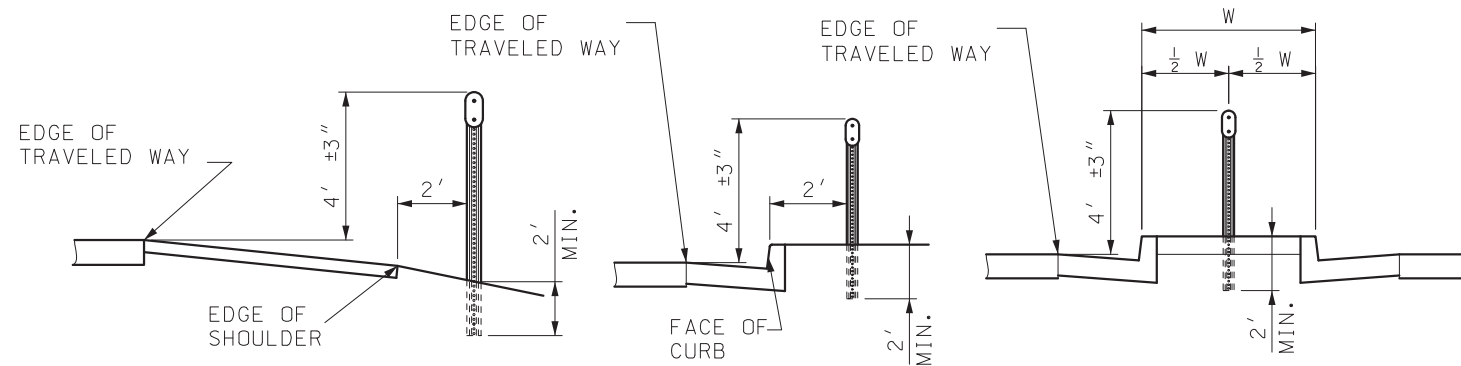
HOLE PUNCHING TO EQUAL  $\frac{3}{8}$ " DIAMETER HOLES, ONE INCH CENTER TO CENTER, BEGINNING ONE-HALF INCH FROM THE END AND CONTINUING THE ENTIRE LENGTH OF THE POST.

| CHANNEL POST DELINEATOR |               |                     |                   |                   |                   |         |                   |
|-------------------------|---------------|---------------------|-------------------|-------------------|-------------------|---------|-------------------|
| LIMITS                  | LBS/FT<br>(2) | DIMENSIONS - INCHES |                   |                   |                   |         |                   |
|                         |               | A                   | B                 | C                 | D                 | E       | F                 |
| NOMINAL                 | 1.12          | 1                   | $2\frac{1}{4}$    | $\frac{7}{8}$     | $\frac{3}{8}$     | 84      | 1                 |
| TOLERANCE               | $\pm 5\%$     | $\pm \frac{1}{8}$   | $\pm \frac{1}{8}$ | $\pm \frac{1}{8}$ | $\pm \frac{1}{8}$ | $\pm 1$ | $\pm \frac{1}{4}$ |

(2) WEIGHT BEFORE GALVANIZING OR PUNCHING.

THE CHANNEL POST FOR DELINEATORS SHALL BE MANUFACTURED FROM DUCTILE ASTM A 36 OR ASTM A 1011 GR 60.

## CHANNEL POST DELINEATOR AND FASTENER DETAILS

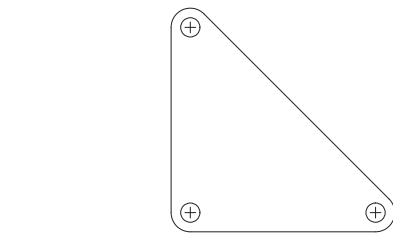


SHOULDER MOUNTED

OUTSIDE  
BARRIER CURB

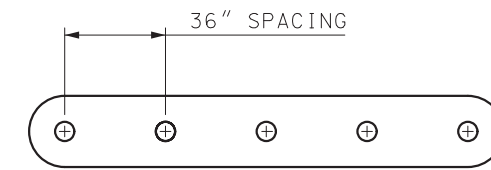
NARROW  
PAVED MEDIAN

## CHANNEL POST DELINEATOR MOUNTING DETAILS

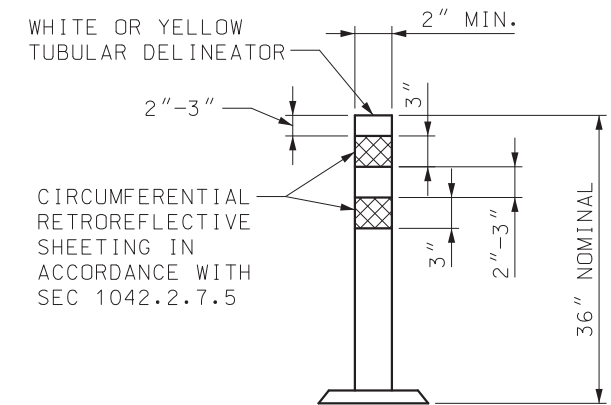


DELINEATOR PLACEMENT LOCATED  
AT THE RADIUS POINTS

## TUBULAR DELINEATOR PLACEMENT FOR ISLANDS



## DELINEATOR PLACEMENT FOR MEDIAN STRIPS



## 36 INCH SURFACE-MOUNT DELINEATOR POST TUBULAR DELINEATOR DETAIL

COLOR OF TUBULAR DELINEATOR AND REFLECTIVE SHEETING SHALL MATCH THE COLOR OF THE CLOSEST PAVEMENT MARKING OR CURB MARKING.

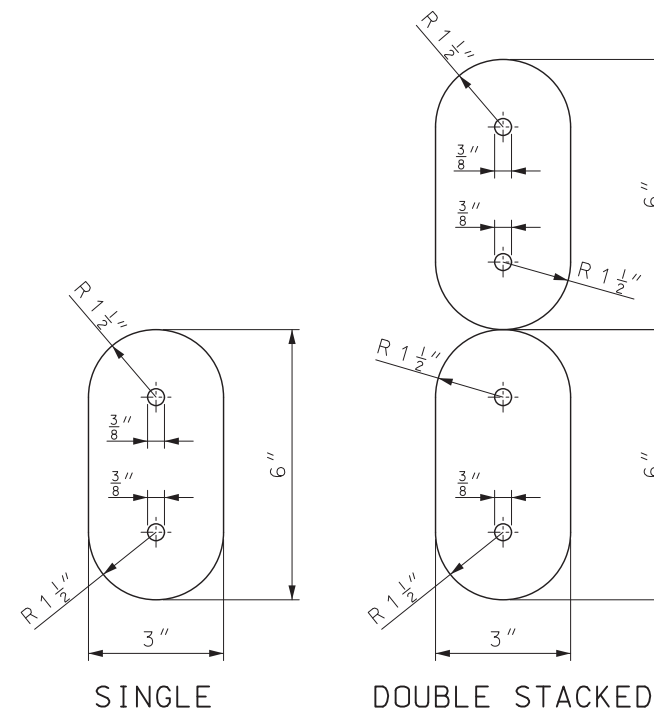
TUBULAR DELINEATOR SHAPE MAY BE ROUND OR T-SHAPED. TUBULAR DELINEATOR SHALL BE PERMANENTLY MOUNTED TO THE PAVEMENT SURFACE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

### NOTES:

RETROREFLECTIVE YELLOW, WHITE OR RED SHEETING IN ACCORDANCE WITH SEC 1042.2.7.5 SHALL BE APPLIED TO ONLY ONE SIDE OF THE DELINEATOR REFLECTOR BODY.

THE COLOR OF THE SHEETING SHALL CORRESPOND TO THE CLOSEST ADJACENT PAVEMENT MARKING.

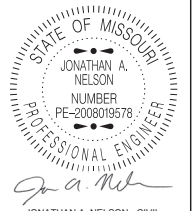
3" X 6" DELINEATOR BODY SHALL BE MADE FROM 0.080 INCH ALUMINUM.

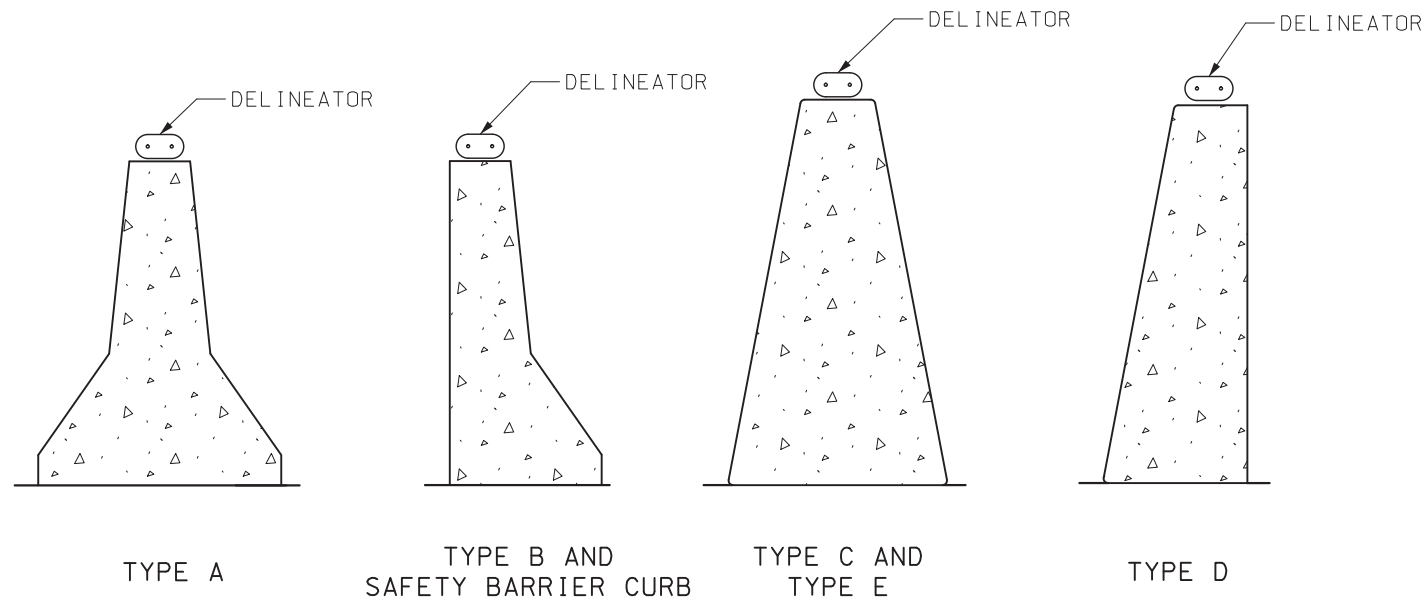


SINGLE

DOUBLE STACKED

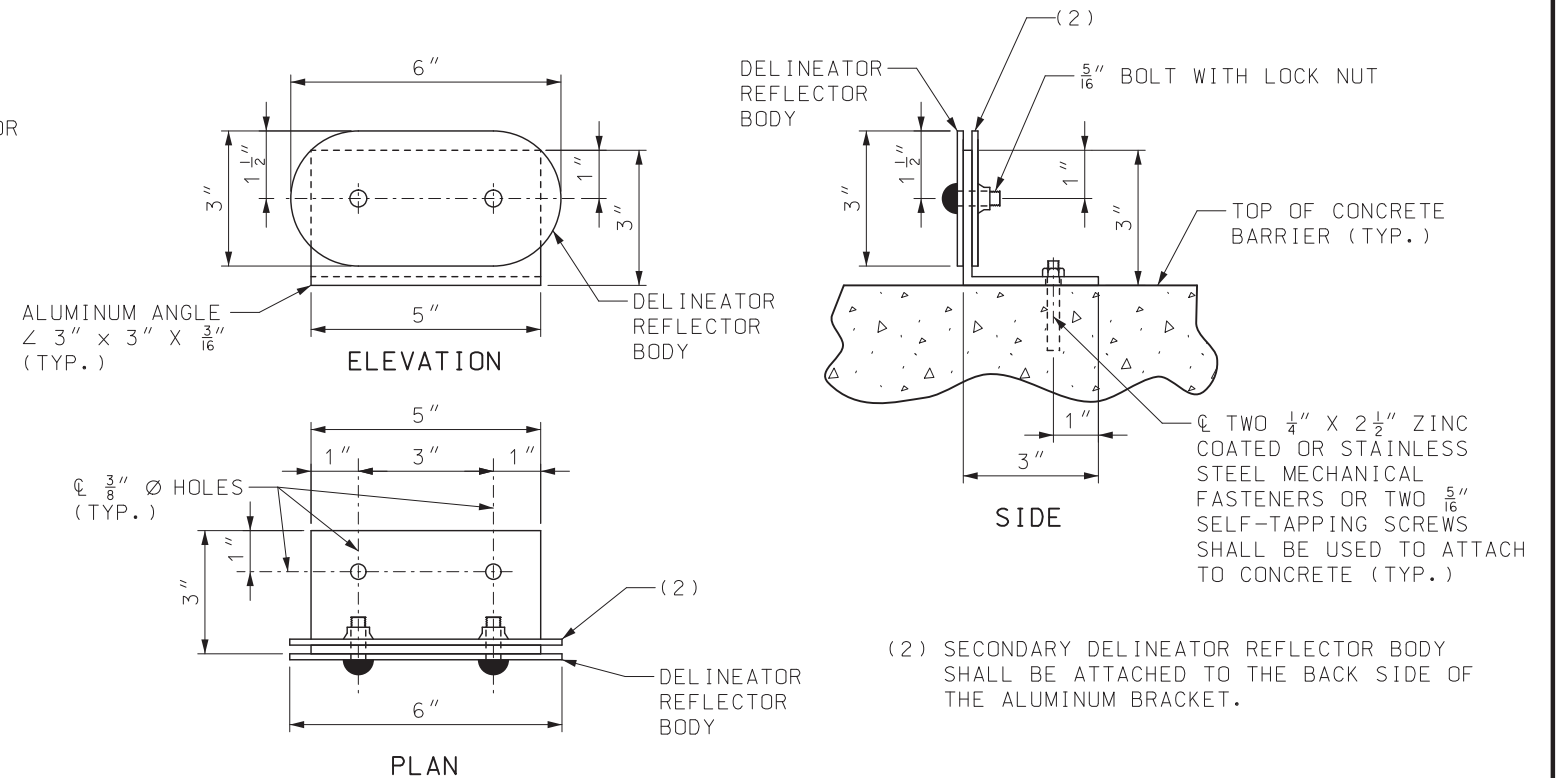
## CHANNEL POST DELINEATOR REFLECTOR

|                                                                                                                                                                         |                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b>                        |                     |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                                        |                     |
|  <b>JONATHAN A.<br/>NELSON</b><br>NUMBER<br>PE-2008019578<br>PROFESSIONAL ENGINEER | <b>DEL INEATORS</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025                                                                                                                    | 903.00              |
| SHEET NO.<br>1 OF 5                                                                                                                                                     |                     |

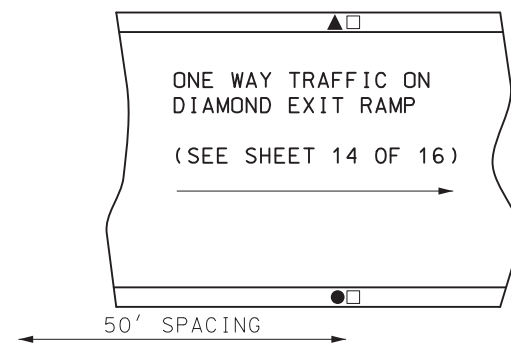
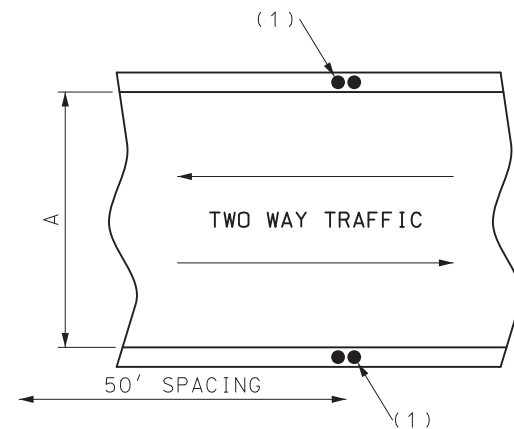


### DELINEATORS ON CONCRETE TRAFFIC BARRIER

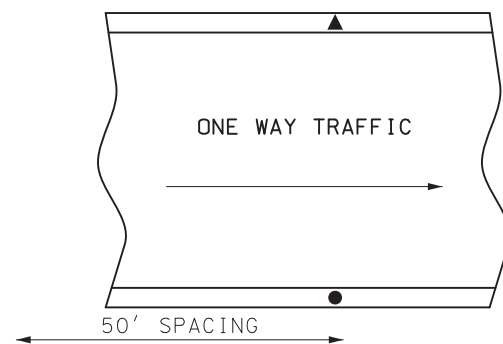
FOR CONCRETE BARRIER DETAILS,  
SEE STD PLANS 617.10 OR BRIDGE PLANS.



### DELINEATOR CONNECTION ON CONCRETE TRAFFIC BARRIER DETAIL

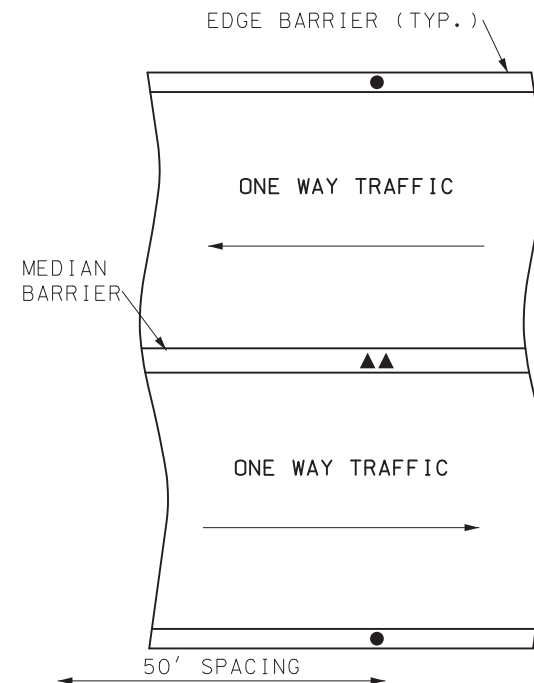


- LEGEND
- WHITE DELINEATOR
  - ▲ YELLOW DELINEATOR
  - RED DELINEATOR



(1) SECONDARY DELINEATOR ON BACK SIDE NOT REQUIRED IF ROADWAY "A" HAS MORE THAN 2 LANES

### ROADWAY OR BRIDGE CONCRETE TRAFFIC BARRIER DELINEATION



#### NOTES:

RETROREFLECTIVE YELLOW, WHITE OR RED SHEETING IN ACCORDANCE WITH SEC 1042.2.7.5 SHALL BE APPLIED TO ONLY ONE SIDE OF THE DELINEATOR REFLECTOR BODY.

THE COLOR OF THE SHEETING SHALL CORRESPOND TO THE CLOSEST ADJACENT PAVEMENT MARKING.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**DEL INEATORS  
CONCRETE BARRIER**



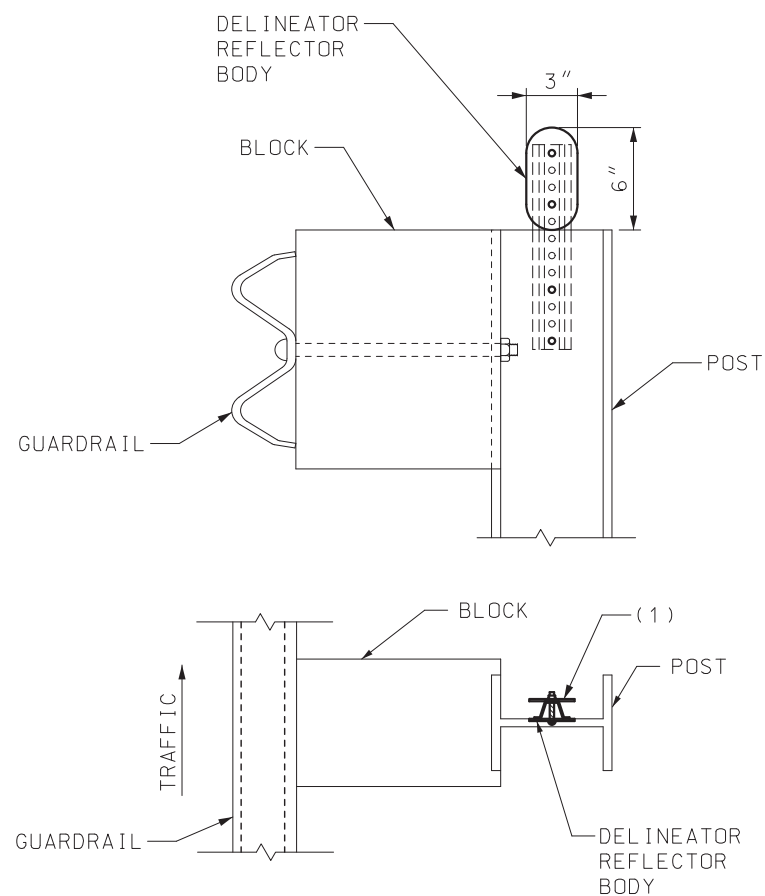
JONATHAN A. NELSON - CIVIL  
MO-PE-2008019578

**DATE EFFECTIVE: 7/1/2025**

**DATE PREPARED: 3/11/2025**

|                          |        |                  |
|--------------------------|--------|------------------|
| DATE EFFECTIVE: 7/1/2025 | 903.00 | SHEET NO. 2 OF 5 |
| DATE PREPARED: 3/11/2025 |        |                  |

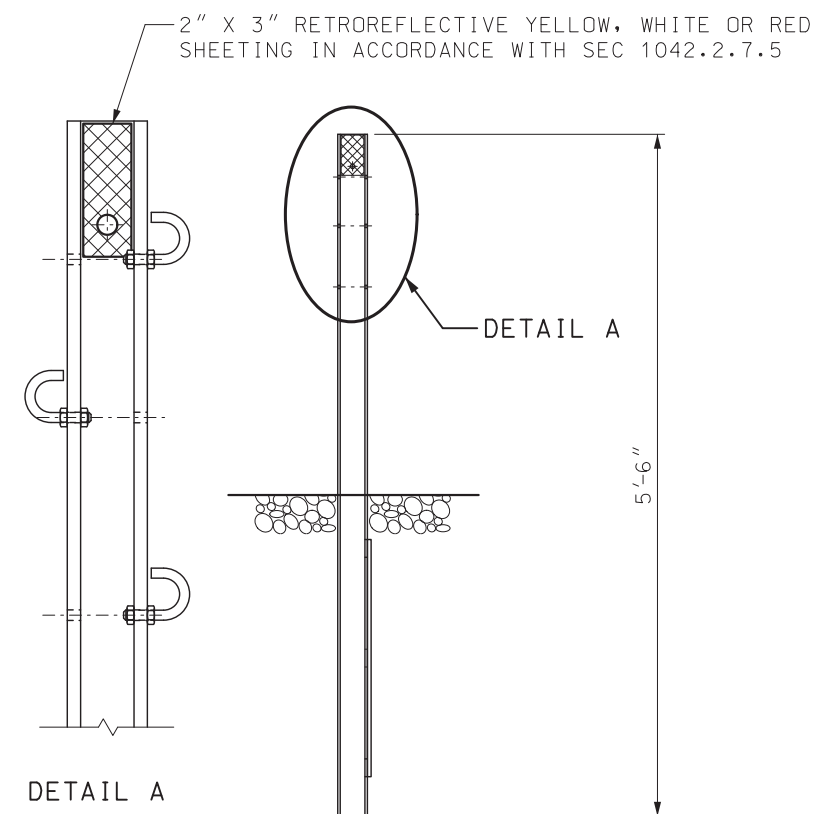




### DELINEATORS ON GUARDRAIL

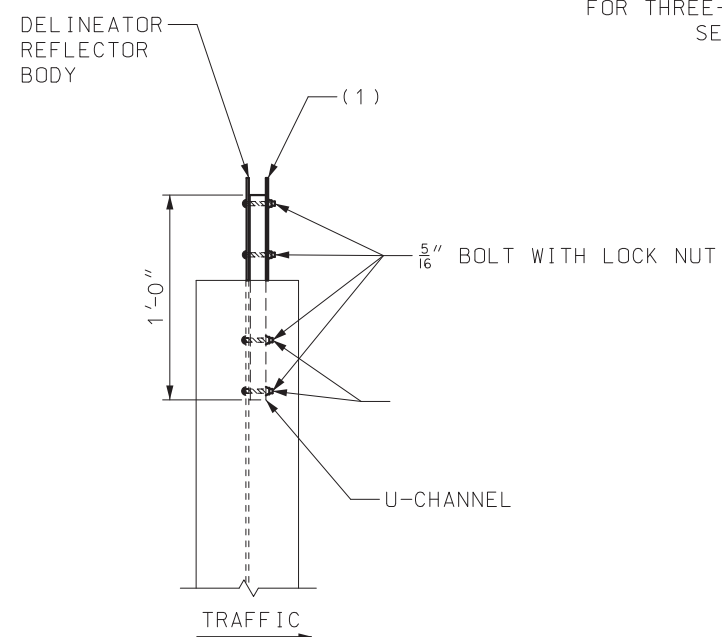
FOR GUARDRAIL DETAILS, SEE STD PLANS 606.00 AND 606.50.

(1) A SECONDARY DELINEATOR WITH RED SHEETING SHALL BE ATTACHED TO THE BACK SIDE OF THE CHANNEL WHEN THE DELINEATION IS PLACED ALONG AN INTERCHANGE RAMP AND COULD BE VIEWED BY WRONG WAY TRAFFIC.



### DELINEATORS ON THREE-STRAND MEDIAN GUARD CABLE

FOR THREE-STRAND GUARD CABLE DETAILS SEE STD PLANS 606.41.



#### NOTES:

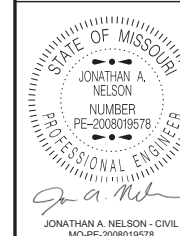
RETROREFLECTIVE YELLOW, WHITE OR RED SHEETING IN ACCORDANCE WITH SEC 1042.2.7.5 SHALL BE APPLIED TO ONLY ONE SIDE OF THE DELINEATOR REFLECTOR BODY.

THE COLOR OF THE SHEETING SHALL CORRESPOND TO THE CLOSEST ADJACENT PAVEMENT MARKING.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

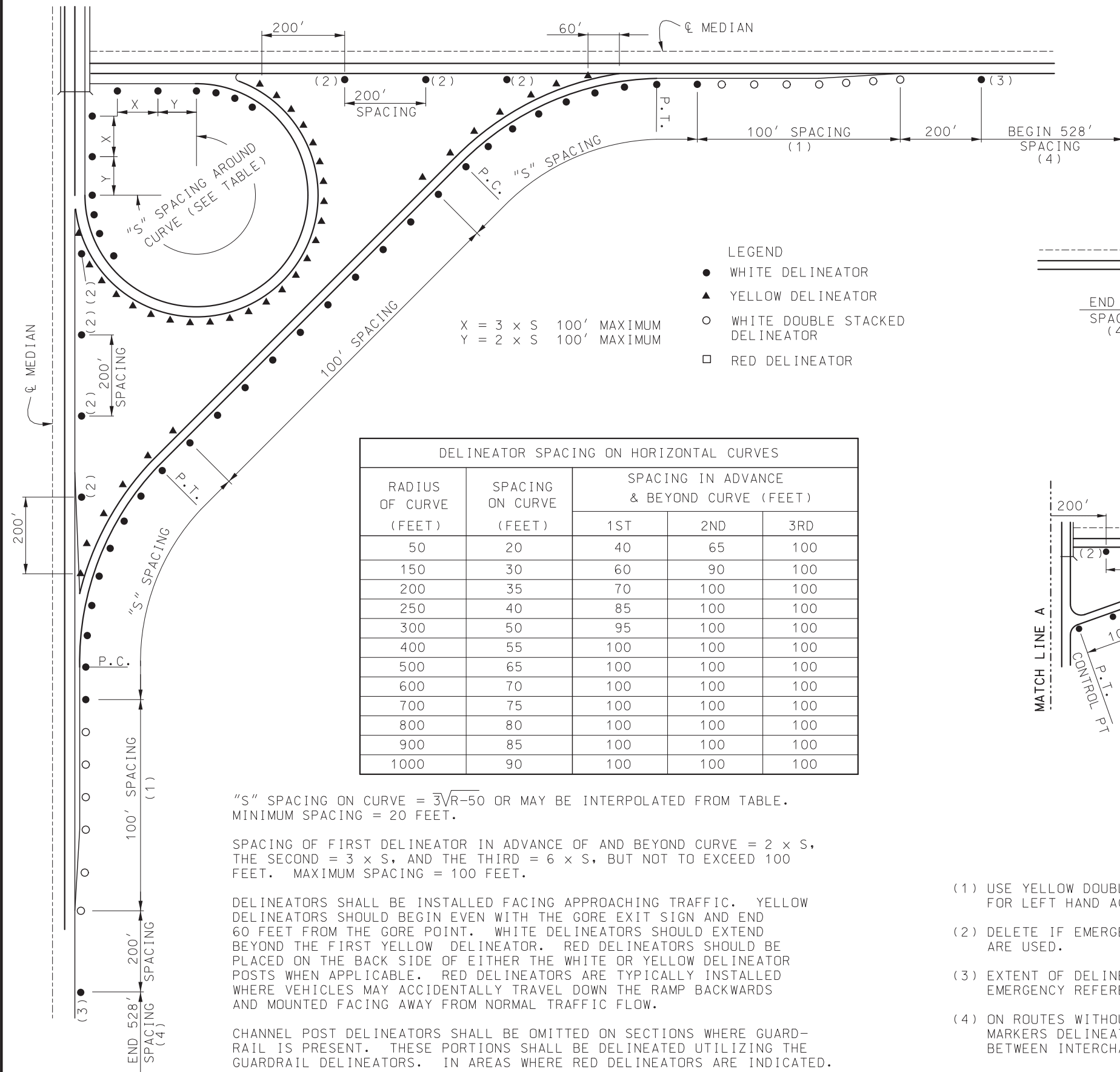


DATE EFFECTIVE: 7/1/2025  
DATE PREPARED: 3/11/2025

### DELINEATORS GUARDRAIL AND GUARDCABLE

903.00

SHEET NO.  
3 OF 5



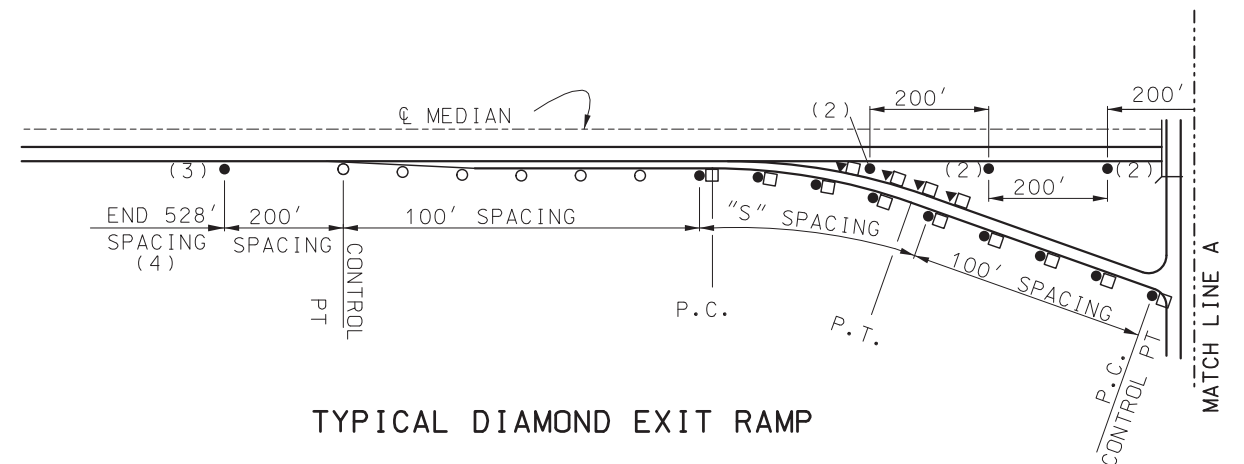
"S" SPACING ON CURVE =  $\sqrt[3]{R-50}$  OR MAY BE INTERPOLATED FROM TABLE.  
MINIMUM SPACING = 20 FEET.

SPACING OF FIRST DELINEATOR IN ADVANCE OF AND BEYOND CURVE =  $2 \times S$ ,  
THE SECOND =  $3 \times S$ , AND THE THIRD =  $6 \times S$ , BUT NOT TO EXCEED 100  
FEET. MAXIMUM SPACING = 100 FEET.

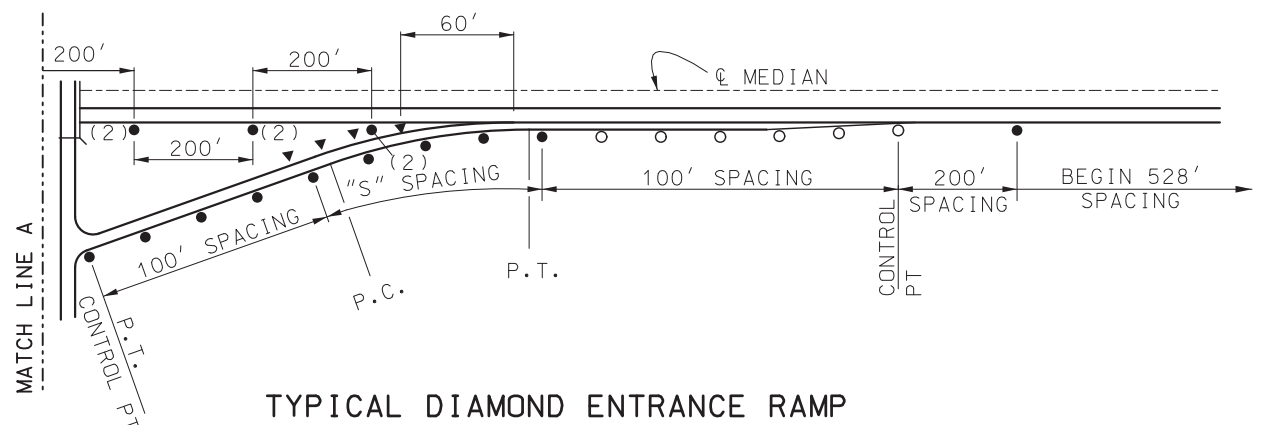
DELINEATORS SHALL BE INSTALLED FACING APPROACHING TRAFFIC. YELLOW  
DELINEATORS SHOULD BEGIN EVEN WITH THE GORE EXIT SIGN AND END  
60 FEET FROM THE GORE POINT. WHITE DELINEATORS SHOULD EXTEND  
BEYOND THE FIRST YELLOW DELINEATOR. RED DELINEATORS SHOULD BE  
PLACED ON THE BACK SIDE OF EITHER THE WHITE OR YELLOW DELINEATOR  
POSTS WHEN APPLICABLE. RED DELINEATORS ARE TYPICALLY INSTALLED  
WHERE VEHICLES MAY ACCIDENTALLY TRAVEL DOWN THE RAMP BACKWARDS  
AND MOUNTED FACING AWAY FROM NORMAL TRAFFIC FLOW.

CHANNEL POST DELINEATORS SHALL BE OMITTED ON SECTIONS WHERE GUARD-  
RAIL IS PRESENT. THESE PORTIONS SHALL BE DELINEATED UTILIZING THE  
GUARDRAIL DELINEATORS. IN AREAS WHERE RED DELINEATORS ARE INDICATED.  
RED RETROREFLECTIVE SHEETING WILL BE PLACED ON THE BACK SIDE OF THE  
GUARDRAIL DELINEATOR.

RETROREFLECTIVE SHEETING SHALL BE IN ACCORDANCE WITH SEC 1042.2.7.5.



TYPICAL DIAMOND EXIT RAMP



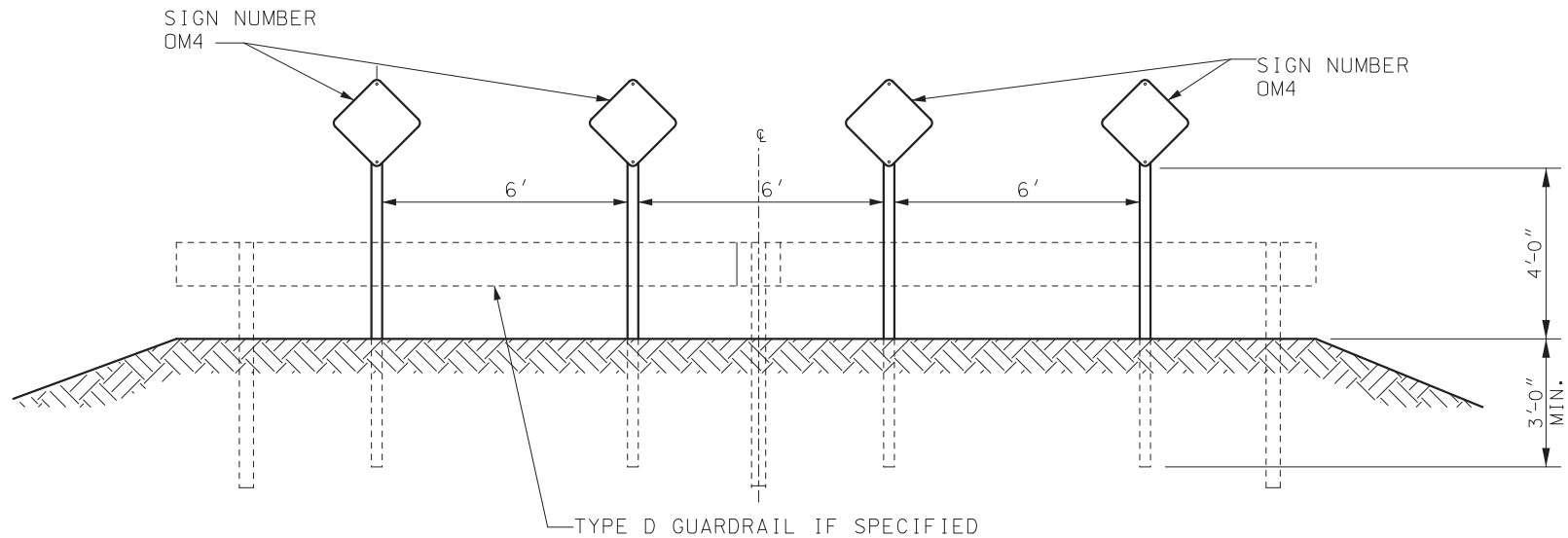
TYPICAL DIAMOND ENTRANCE RAMP  
TYPICAL INTERCHANGE

#### NOTES:

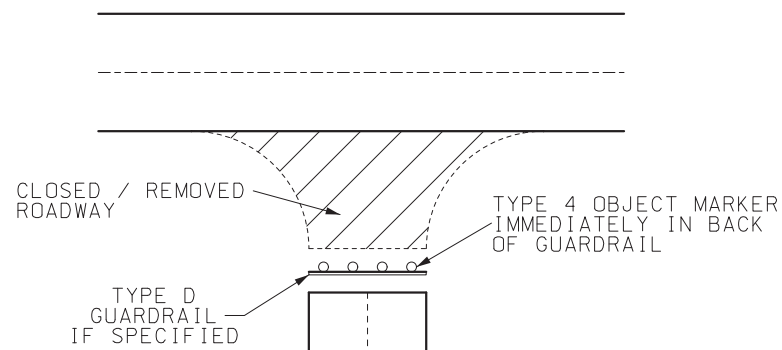
THE CONTRACT UNIT PRICE FOR EACH CHANNEL POST  
DELINEATOR SHALL INCLUDE THE REFLECTOR, FASTENERS  
AND POST.

- (1) USE YELLOW DOUBLE STACKED DELINEATORS FOR LEFT HAND ACCEL/DECEL LANES.
- (2) DELETE IF EMERGENCY REFERENCE MARKERS ARE USED.
- (3) EXTENT OF DELINEATION ON ROUTES WITH EMERGENCY REFERENCE MARKERS.
- (4) ON ROUTES WITHOUT EMERGENCY REFERENCE MARKERS DELINEATORS SHALL BE INSTALLED BETWEEN INTERCHANGES EVERY 528'.

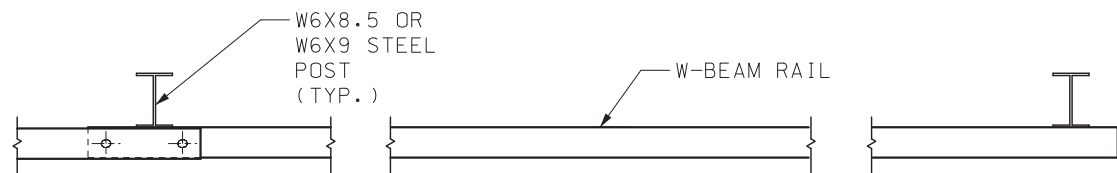
|                                                      |  |                                                                                  |  |
|------------------------------------------------------|--|----------------------------------------------------------------------------------|--|
|                                                      |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |  |
|                                                      |  | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025 |  | <b>DEL INEATORS INTERCHANGE</b>                                                  |  |
| 903.00                                               |  | SHEET NO.<br>4 OF 5                                                              |  |



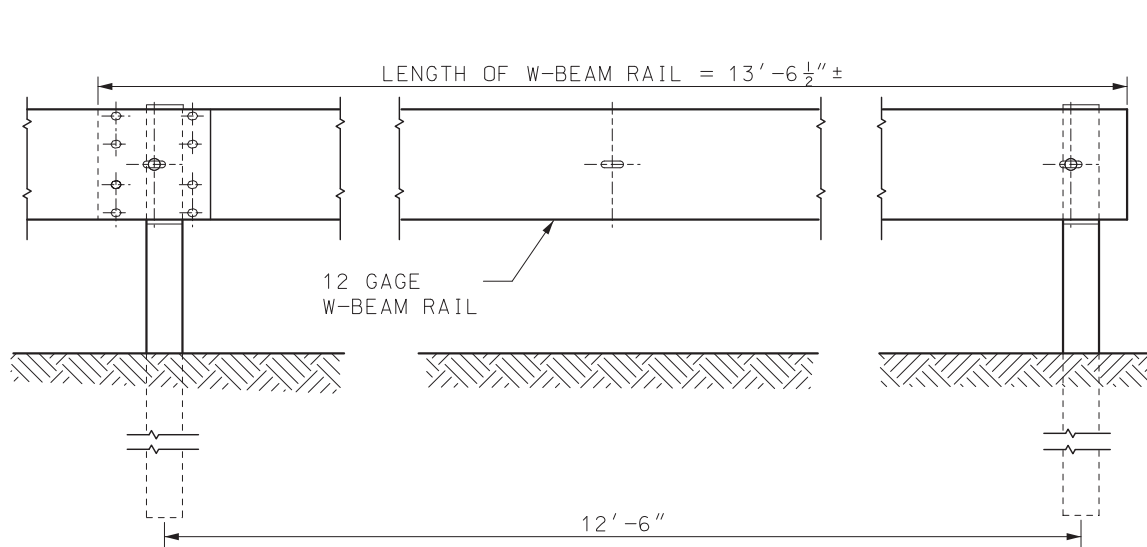
TYPE 4 OBJECT MARKER INSTALLATION



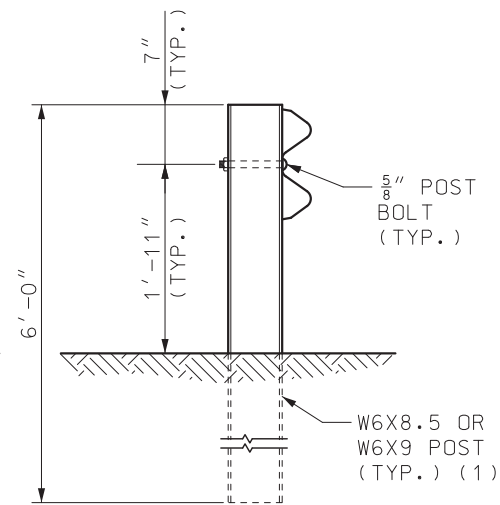
TYPICAL ROAD CLOSURE



PLAN



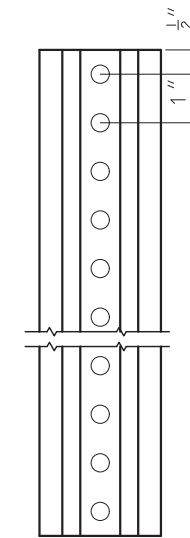
ELEVATION



STEEL POST

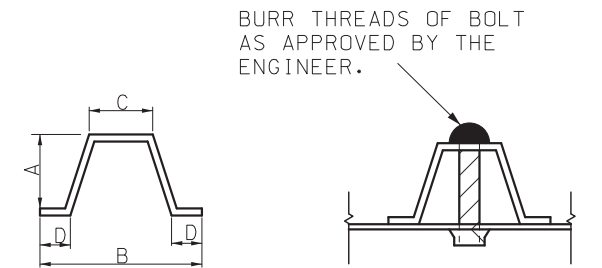
(1) THE CONTRACTOR MAY FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH SEC 1040.

TYPE D GUARDRAIL



| STEEL OBJECT MARKER POST |               |                               |                               |                               |                             |
|--------------------------|---------------|-------------------------------|-------------------------------|-------------------------------|-----------------------------|
| LIMITS                   | LBS/FT<br>(2) | DIMENSIONS - INCHES           |                               |                               |                             |
|                          |               | A                             | B                             | C                             | D                           |
| MIN.                     | 2.40          | 1 <sup>1</sup> / <sub>4</sub> | 2 <sup>1</sup> / <sub>2</sub> | 1                             | <sup>1</sup> / <sub>2</sub> |
| MAX.                     | 2.80          | 1 <sup>5</sup> / <sub>8</sub> | 3 <sup>1</sup> / <sub>4</sub> | 1 <sup>3</sup> / <sub>8</sub> | <sup>3</sup> / <sub>4</sub> |

(2) WEIGHT BEFORE GALVANIZING OR PUNCHING. LIMITS SHOWN ARE ABSOLUTE. NO FURTHER WEIGHT, DIMENSIONAL OR COMMERCIAL TOLERANCE WILL BE ACCEPTABLE.



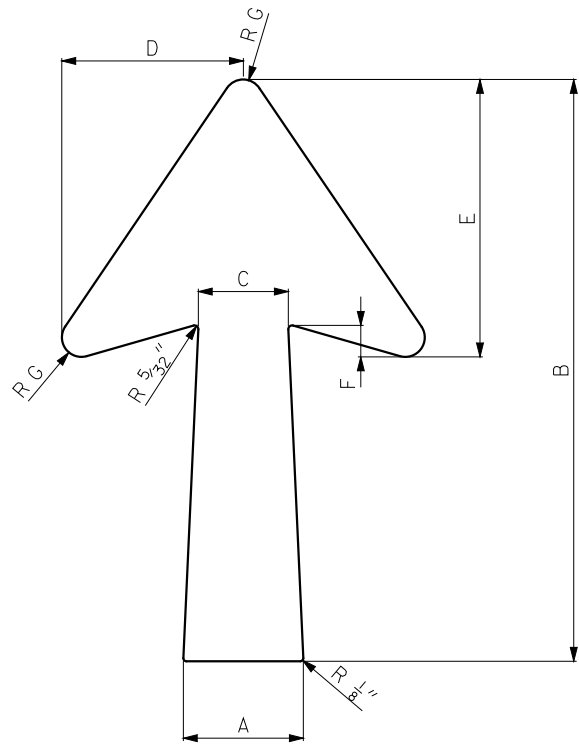
HOLE PUNCHING TO EQUAL <sup>3</sup>/<sub>8</sub>" DIAMETER HOLES, ONE INCH CENTER TO CENTER, BEGINNING ONE-HALF INCH FROM THE END AND CONTINUING THE ENTIRE LENGTH OF THE POST.

OBJECT MARKER POST AND FASTENER DETAILS

NOTES:

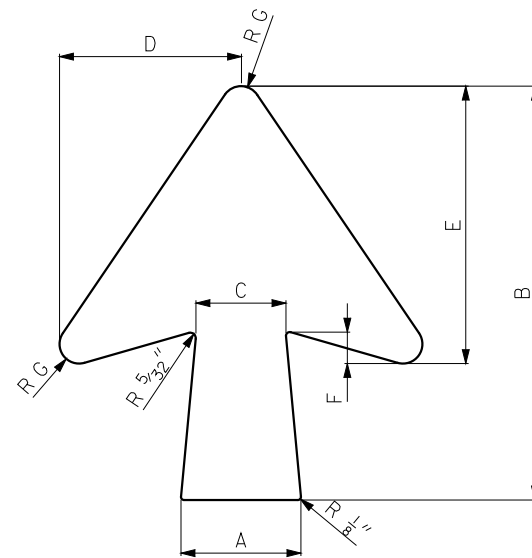
TYPE D GUARDRAIL IS ACCESS RESTRAINT AND VISUAL TARGET VALUE ONLY. IT HAS NO REDIRECTIVE CAPABILITY.

|                                                                                                                                                                                                                                  |                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                             |
|                                                                                                                                             | <b>DEL INEATORS<br/>OBJECT MARKERS FOR<br/>ROAD CLOSURE</b> |
| DATE EFFECTIVE: 7/1/2025<br>DATE PREPARED: 3/11/2025                                                                                                                                                                             | <b>903.00</b>                                               |
| SHEET NO.<br><b>5 OF 5</b>                                                                                                                                                                                                       |                                                             |



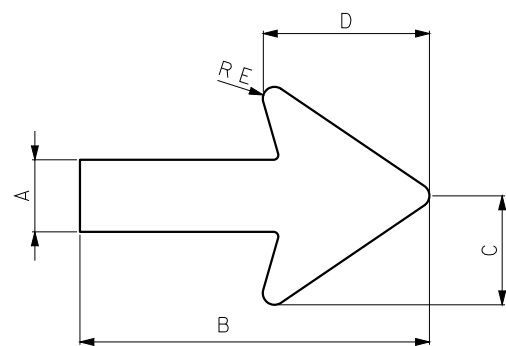
TYPE A

| TYPE A ARROW TABLE   |        |     |        |         |          |         |         |
|----------------------|--------|-----|--------|---------|----------|---------|---------|
| LETTER SIZE          | A      | B   | C      | D       | E        | F       | RG      |
| 8" U.C.              | 5"     | 25" | 3 3/4" | 7 9/16" | 11 9/16" | 1 5/16" | 1 3/16" |
| 10.67" & 13.33" U.C. | 6"     | 30" | 4 1/2" | 9 1/8"  | 14"      | 1 1/2"  | 3/4"    |
| 16" U.C.             | 7 1/8" | 35" | 5 3/8" | 11 1/8" | 17"      | 1 3/4"  | 1"      |



TYPE B

| TYPE B ARROW TABLE |        |     |        |         |          |         |         |
|--------------------|--------|-----|--------|---------|----------|---------|---------|
| LETTER SIZE        | A      | B   | C      | D       | E        | F       | RG      |
| 8" - 10.67" U.C.   | 5"     | 17" | 3 3/4" | 7 9/16" | 11 9/16" | 1 5/16" | 1 3/16" |
| 13.33" U.C.        | 6"     | 20" | 4 1/2" | 9 1/8"  | 14"      | 1 1/2"  | 3/4"    |
| 16" U.C.           | 7 1/8" | 25" | 5 3/8" | 11 1/8" | 17"      | 1 3/4"  | 1"      |

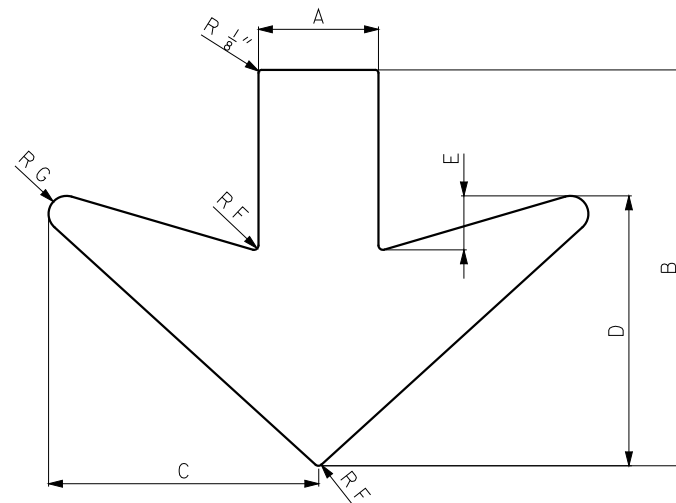


TYPE D

| TYPE D ARROW TABLE |        |         |         |         |        |
|--------------------|--------|---------|---------|---------|--------|
| LETTER SIZE        | A      | B       | C       | D       | RE     |
| 6" U.C.**          | 2 1/4" | 9" MIN. | 3"      | 4 1/2"  | 7/16"  |
| 8" U.C.            | 2 3/4" | 12 1/4" | 3 9/16" | 6 1/8"  | 9/16"  |
| 10.67" U.C.        | 3 1/4" | 14 1/2" | 4 3/8"  | 7 1/4"  | 5/8"   |
| 13.33" U.C.        | 3 3/4" | 16 3/4" | 5 1/16" | 8 3/8"  | 3/4"   |
| 16" U.C.           | 4 1/2" | 20"     | 6 1/16" | 10"     | 7/8"   |
| 20" U.C.           | 5 1/2" | 24 1/2" | 7 1/2"  | 11 1/8" | 1 1/8" |

\* FOR HORIZONTAL PLACEMENT UNDER LEGEND, DIMENSION "B" WILL BE EXTENDED, AT 1 FOOT INCREMENTS, TO APPROXIMATELY 50% OF THE MAXIMUM LEGEND WIDTH.

\*\* FOR USE ON SIGNS WITH TYPE L-1 OR L-3 LEGENDS.



TYPE C

| TYPE C OVERHEAD ARROW DIMENSIONS |     |     |     |    |       |    |
|----------------------------------|-----|-----|-----|----|-------|----|
| A                                | B   | C   | D   | E  | RF    | RG |
| 6 1/2"                           | 22" | 16" | 16" | 3" | 3/16" | 1" |

GENERAL NOTES:

ARROWS FOR REFERENCE ONLY.

ARROW DETAILS AVAILABLE FROM TRAFFIC AND HIGHWAY SAFETY DIVISION.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

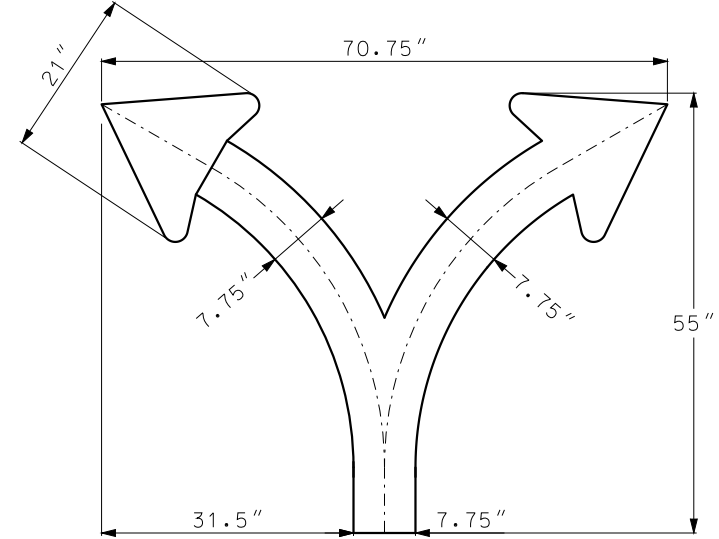
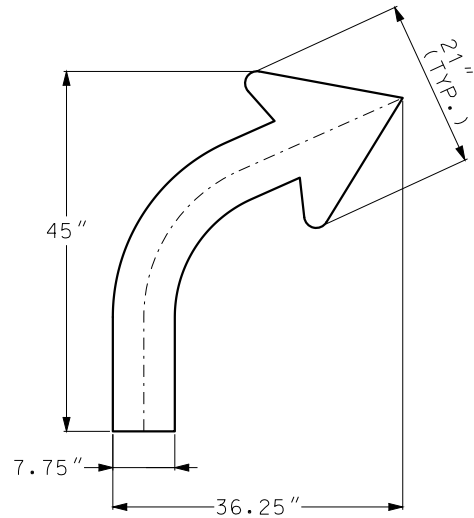
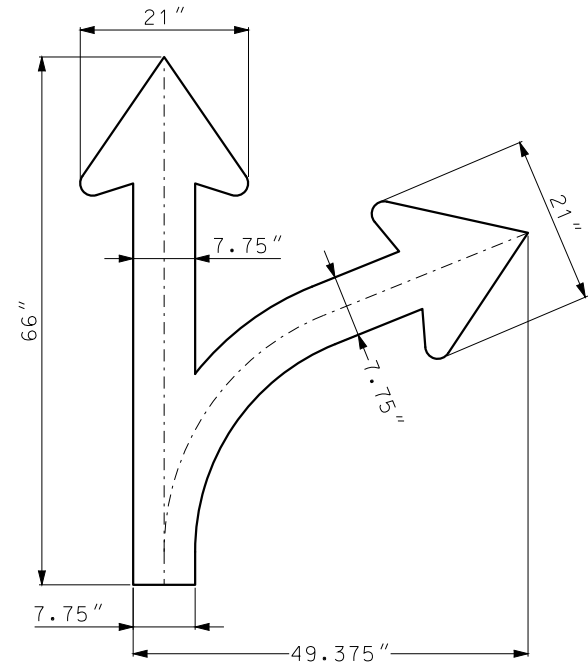
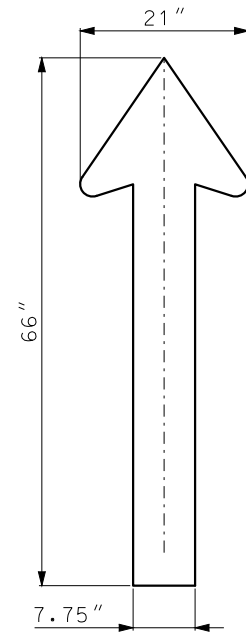
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**STANDARD ARROW DETAILS**

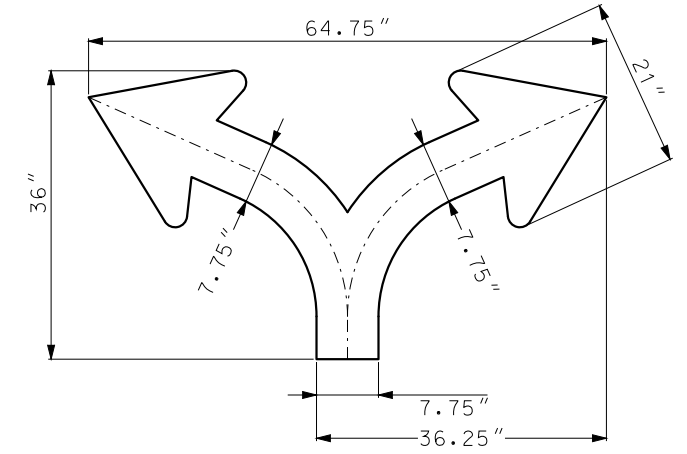
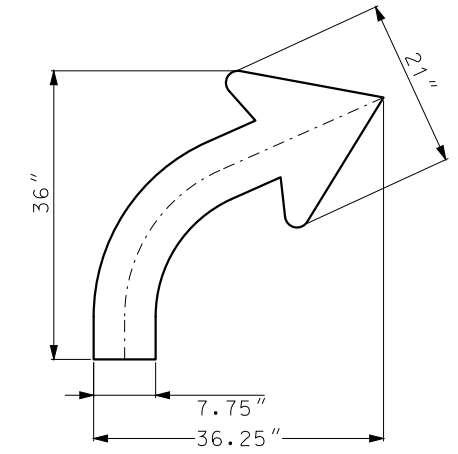
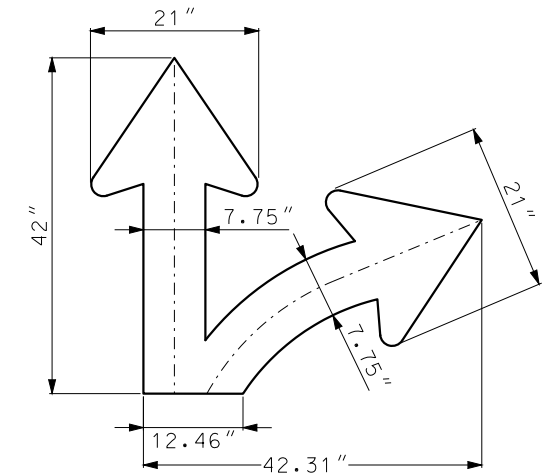
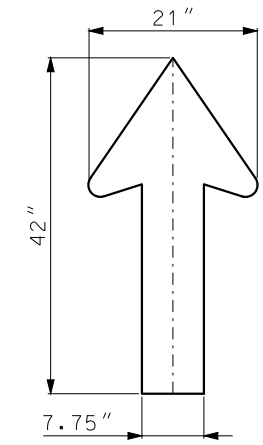
DATE EFFECTIVE: 10/01/2016  
DATE PREPARED: 8/11/2016

**903.01J**

SHEET NO.  
1 OF 2



MUTCD ARROWS



MODOT ARROWS

GENERAL NOTES:  
 ARROWS FOR REFERENCE ONLY.  
 ARROW DETAILS AVAILABLE FROM TRAFFIC AND HIGHWAY  
 SAFETY DIVISION.

|                                                                                                                                                                                                                                                                                                             |                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                            |                                                   |
|  <p>STATE OF MISSOURI<br/>         EILEEN H. RACKERS<br/>         NUMBER PE-28336<br/>         PROFESSIONAL ENGINEER</p> <p>THIS SHEET HAS BEEN<br/>         SIGNED, SEALED AND DATED<br/>         ELECTRONICALLY.</p> | <p><b>STANDARD ARROW<br/>         DETAILS</b></p> |
| DATE EFFECTIVE: 10/01/2016<br>DATE PREPARED: 8/11/2016                                                                                                                                                                                                                                                      | <p><b>903.01J</b></p>                             |
| SHEET NO.<br>2 OF 2                                                                                                                                                                                                                                                                                         |                                                   |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

STRUCTURAL SIGN DATA

| DESIGNATION                  | COLOR SCHEME |                 | SHEETING          |                   |
|------------------------------|--------------|-----------------|-------------------|-------------------|
|                              | LEGEND       | BACKGROUND      | LEGEND            | BACKGROUND        |
| STRUCTURAL (ST)              | BLACK        | WHITE           | OPAQUE BLACK FILM | ASTM TYPE 4       |
|                              | WHITE        | RED             | ASTM TYPE 9 OR 11 | ASTM TYPE 4       |
|                              | WHITE        | GREEN           | ASTM TYPE 9 OR 11 | ASTM TYPE 4       |
|                              | WHITE        | BLUE            | ASTM TYPE 9 OR 11 | ASTM TYPE 4       |
|                              | WHITE        | BROWN           | ASTM TYPE 9 OR 11 | ASTM TYPE 4       |
| STRUCTURAL FLUORESCENT (STF) | BLACK        | FL YELLOW       | OPAQUE BLACK FILM | ASTM TYPE 9 OR 11 |
|                              | BLACK        | FL YELLOW GREEN | OPAQUE BLACK FILM | ASTM TYPE 9 OR 11 |
|                              | BLACK        | FL ORANGE       | OPAQUE BLACK FILM | ASTM TYPE 9 OR 11 |

NOTE: WHITE LEGEND IS DIRECT APPLIED UNLESS SPECIFIED OTHERWISE.

FLAT SHEET SIGN DATA

| DESIGNATION                  | COLOR SCHEME |                 | SHEETING                          |
|------------------------------|--------------|-----------------|-----------------------------------|
|                              | LEGEND       | BACKGROUND      |                                   |
| FLAT SHEET (SH)              | BLACK **     | WHITE           | ASTM TYPE 4 WHITE                 |
|                              | WHITE        | BLACK **        | ASTM TYPE 4 WHITE                 |
|                              | RED          | WHITE           | ASTM TYPE 4 WHITE                 |
|                              | WHITE        | RED             | ASTM TYPE 4 WHITE                 |
|                              | WHITE        | GREEN           | ASTM TYPE 4 WHITE                 |
|                              | GREEN        | WHITE           | ASTM TYPE 4 WHITE                 |
|                              | WHITE        | BLUE            | ASTM TYPE 4 WHITE                 |
|                              | WHITE        | BROWN           | ASTM TYPE 4 WHITE                 |
|                              | BLACK **     | FL YELLOW       | ASTM TYPE 9 OR 11 FL YELLOW       |
| FLAT SHEET FLUORESCENT (SHF) | BLACK **     | FL YELLOW GREEN | ASTM TYPE 9 OR 11 FL YELLOW GREEN |
|                              | BLACK **     | FL ORANGE       | ASTM TYPE 9 OR 11 FL ORANGE       |

\*\* OPAQUE INK OR FILM

NOTE: LEGEND AND BACKGROUND COLORS ARE ACHIEVED THROUGH TRANSLUCENT INKS AND FILMS.

FLAT SHEET THICKNESS

| SIGN SIZE                 | THICKNESS |
|---------------------------|-----------|
| 9 SF OR LESS              | 0.080 IN. |
| OVER 9 SF BUT UNDER 16 SF | 0.100 IN. |
| 16 SF OR LARGER           | 0.125 IN. |

GENERAL NOTES:

GROUND MOUNTED SIGNS GREATER THAN 5 FEET WIDE OR GREATER THAN 30 SQUARE FEET SHALL BE STRUCTURAL.

ALL NONSTANDARD SIGNS NOT FOUND IN THE MUTCD SHS MANUAL SHALL BE DETAILED BY THE HIGHWAY SAFETY AND TRAFFIC DIVISION OFFICE.

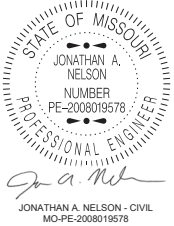
REFER TO STANDARD SPECIFICATION SEC 1042 FOR SHEETING, SUBSTRATE AND FABRICATION DETAILS.

FOR MOUNTING DETAILS, SEE STANDARD PLAN 903.02.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



JONATHAN A. NELSON - CIVIL  
MO-PE-2008019578

HIGHWAY SIGNING

GENERAL SIGN DATA

DATE EFFECTIVE: 1/1/2025

DATE PREPARED: 10/4/2024

903.02AQ

SHEET NO.

1 OF 8

MODOT ID LABEL DETAILS  
PLACED ON THE SIGN FACE



(1) USED ON SIGNS 9 SF AND LARGER

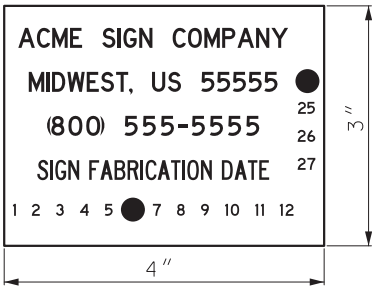


(1) USED ON SIGNS LESS THAN 9 SF

VENDOR ID LABEL DETAILS  
PLACED ON THE BACK OF THE SIGN



OPTIONAL



(2)

OPTIONAL



(3)

- (1) MODOT ID LABEL DETAILS AVAILABLE FROM THE HIGHWAY SAFETY AND TRAFFIC DIVISION.
- (2) TO FACILITATE MASS PRODUCTION OF LABELS, THE FABRICATION DATE MAY BE INDICATED BY DISPLAYING NUMBERS FOR MONTHS ALONG THE BOTTOM OF THE LABEL AND NUMBERS FOR YEARS ALONG THE RIGHT SIDE OF THE LABEL. THE FABRICATION DATE WOULD BE INDICATED BY HOLE PUNCHING THE APPROPRIATE NUMBERS (OR SOME EQUIVALENT PERMANENT METHOD TO BLOCK OUT OF THE NUMBERS) FOR THE MONTH AND YEAR, BEFORE THE LABEL IS APPLIED TO THE SIGN.
- (3) INDIVIDUAL DECALS MAY BE USED TO DISPLAY THE VENDOR INFORMATION AND THE FABRICATION DATE. DECALS SHALL BE INSTALLED IN CLOSE VERTICAL PROXIMITY.
- (4) THE MODOT ID LABEL MAY BE PLACED ON THE BACK OF THE SIGN ABOVE THE VENDOR ID LABEL IF THERE IS INSUFFICIENT SPACE AVAILABLE TO DISPLAY THE ID LABEL ON THE SIGN FACE WITHOUT INTERFERING WITH THE SIGN LEGEND OR BORDER.

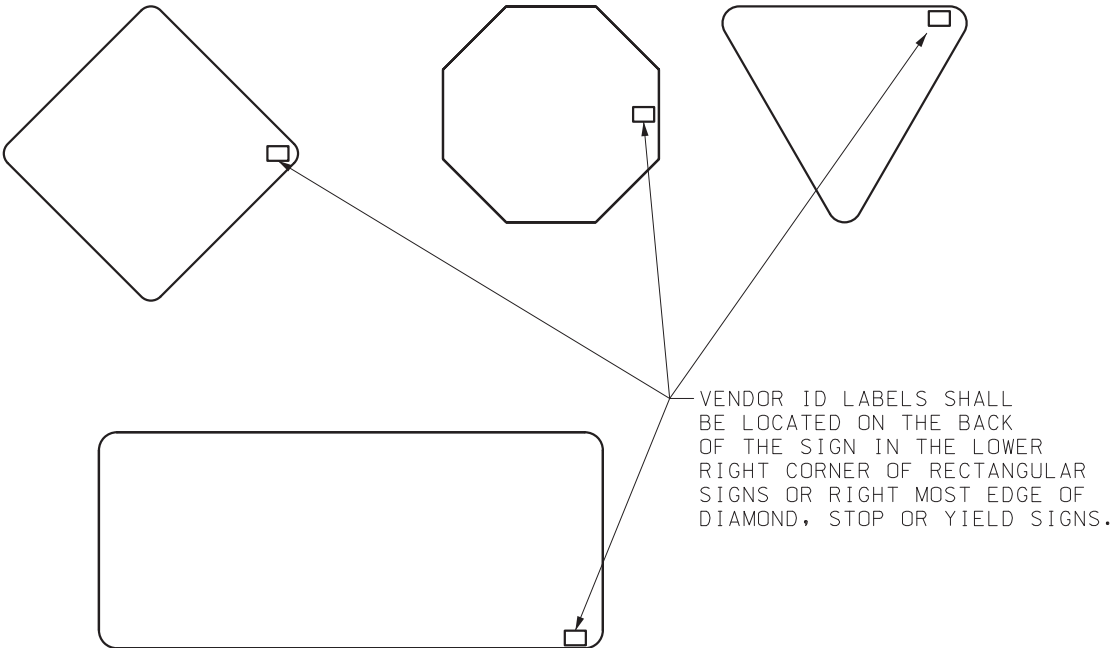
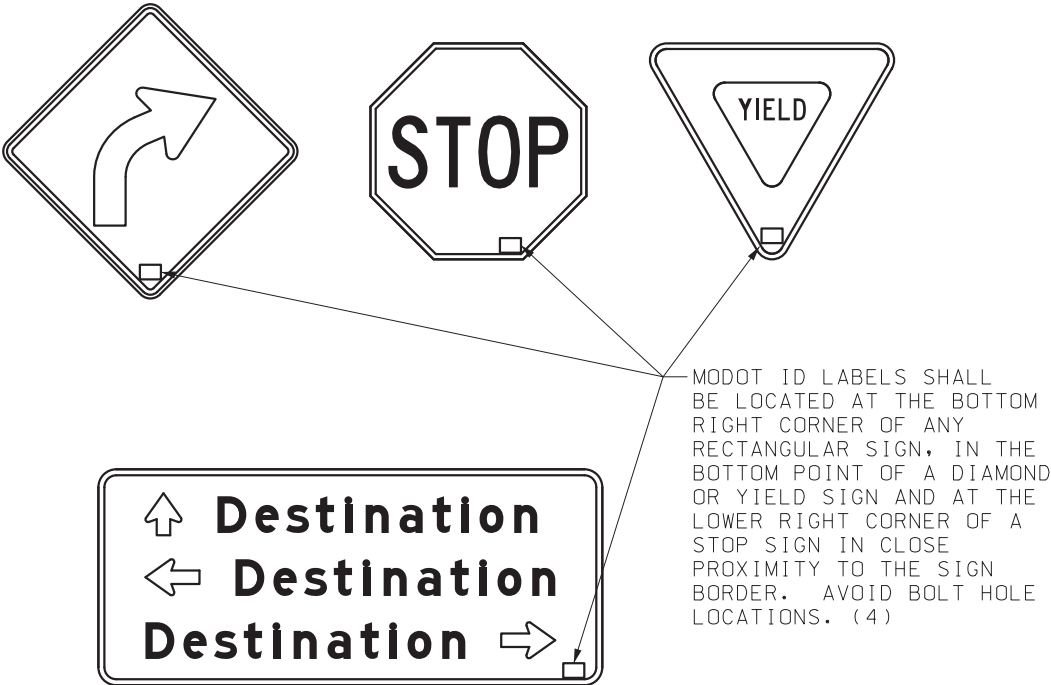
GENERAL NOTES:

ALL DECALS SHALL BE SILK SCREEN PRINTED WITH MATCHED COMPONENT INK AND SHEETING MATERIALS TO PROVIDE A LABEL THAT HAS AN EQUAL LIFE EXPECTANCY AS THE SIGN FACE.

MODOT ID LABELS SHALL BE PRINTED ON CLEAR ELECTROCURT FILM BACKGROUND WITH BLACK INK OR IT MAY BE INCORPORATED INTO THE SILK SCREEN DETAIL AND PRINTED ALONG WITH THE SIGN FACE. IF THE LABEL IS APPLIED IN THIS MANNER THE LEGEND OF THE LABEL SHALL MATCH THE COLOR OF THE SIGN LEGEND IT IS BEING APPLIED TO. THE LABEL SHALL NOT HAVE ANY BACKGROUND COLOR OR BORDER.

VENDOR ID LABEL SHALL CONTAIN THE COMPANY CONTACT INFORMATION (INCLUDING FULL NAME, CITY, STATE, PHONE NUMBER) AND THE SIGN FABRICATION DATE.

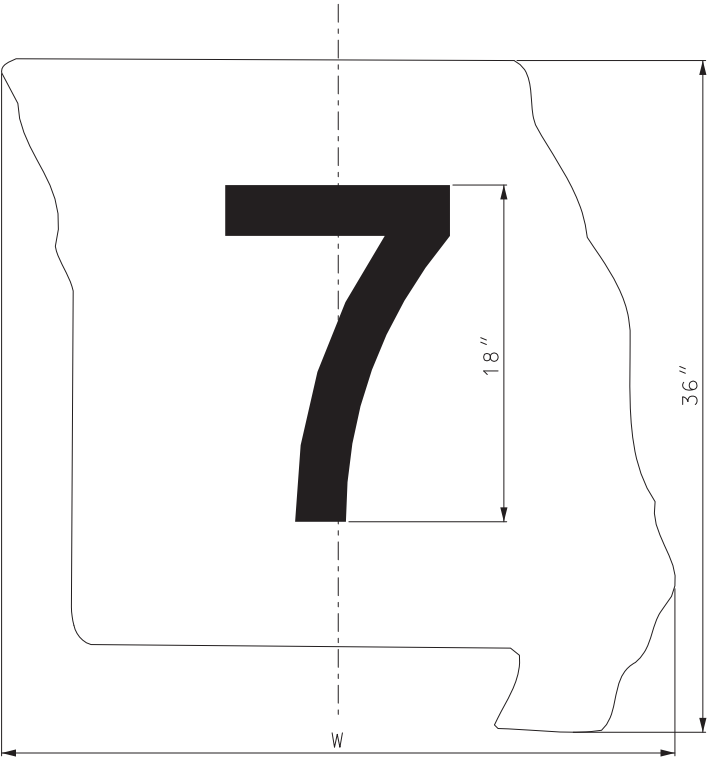
VENDOR ID LABEL SHALL BE PRINTED ON A WHITE BACKGROUND WITH BLACK INK AND THE LEGEND SHALL BE A MINIMUM OF 1/4".



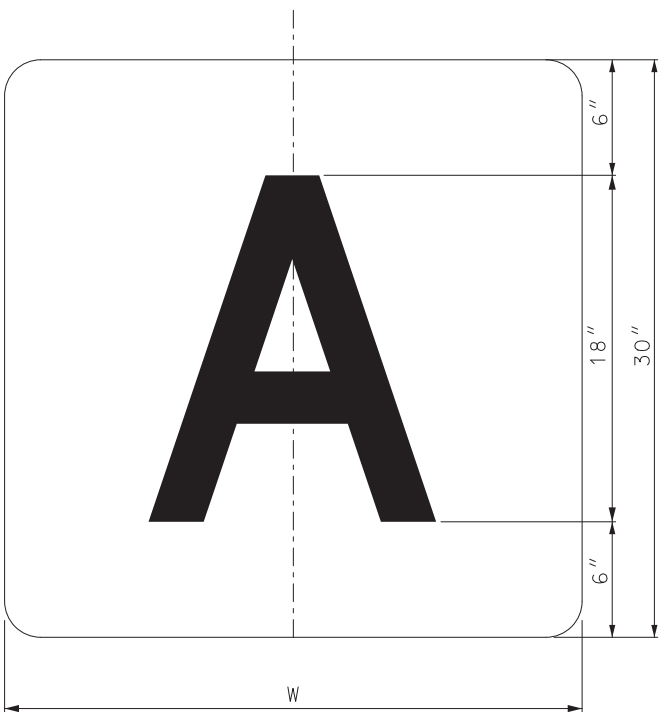
|                                                                                       |  |                                                                                  |                     |
|---------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------|---------------------|
|  |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |                     |
|                                                                                       |  | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                     |
|  |  | <b>HIGHWAY SIGNING</b><br>GENERAL SIGN DATA                                      |                     |
| DATE EFFECTIVE: 1/1/2025                                                              |  | <b>903.02AQ</b>                                                                  | SHEET NO.<br>2 OF 8 |
| DATE PREPARED: 10/4/2024                                                              |  |                                                                                  |                     |



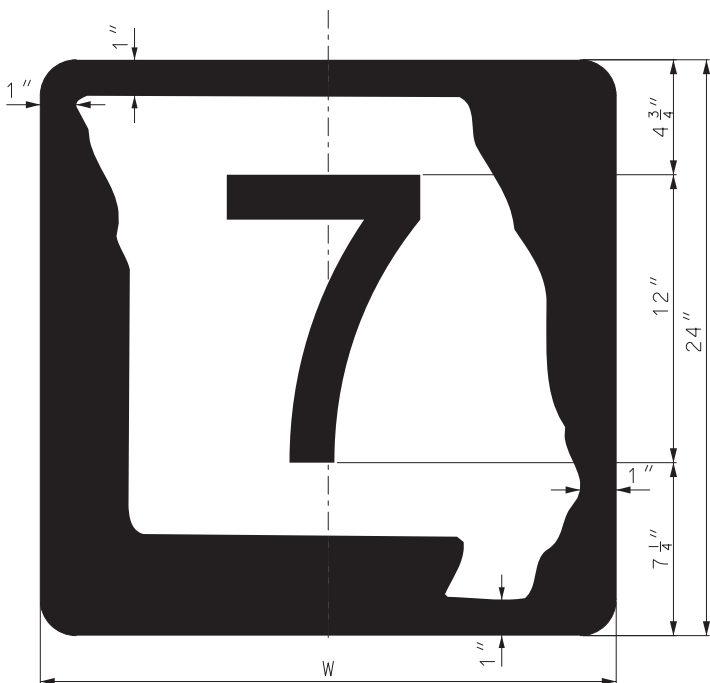
STATE NUMBER ROUTE SHIELD  
GUIDE SIGN USE



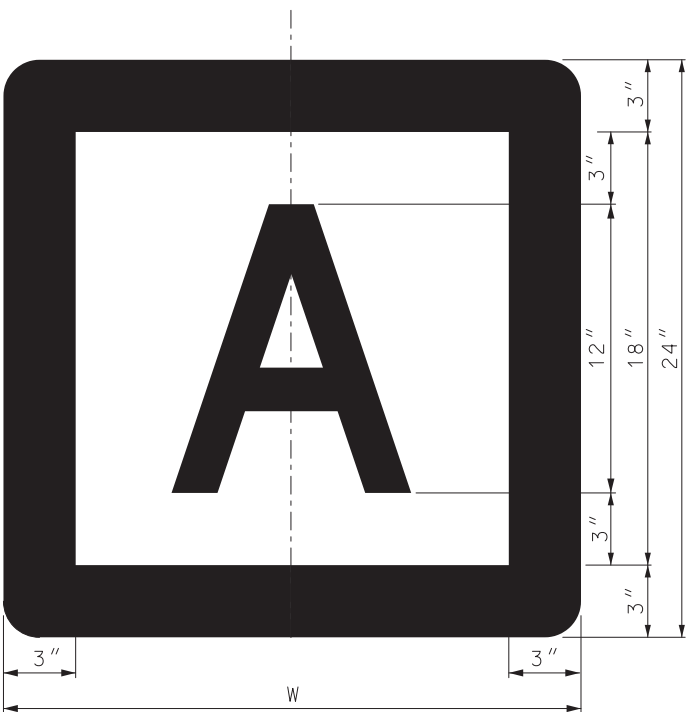
STATE LETTER ROUTE SHIELD  
GUIDE SIGN USE



STATE NUMBER ROUTE SHIELD  
INDEPENDENT USE



STATE LETTER ROUTE SHIELD  
INDEPENDENT USE



| LOCATION        | ROUTE NUMBER | WIDTH (INCHES) | LEGEND FONTS |
|-----------------|--------------|----------------|--------------|
| INDEPENDENT USE | 1 & 2 DIGITS | 24             | D,C          |
| INDEPENDENT USE | 3 DIGITS     | 30             | D,C,B        |
| GUIDE SIGN USE  | 1 & 2 DIGITS | 36             | D,C          |
| GUIDE SIGN USE  | 3 DIGITS     | 45             | D,C,B        |

STATE NUMBER ROUTE SHIELD



| LOCATION        | NO. OF LETTERS | WIDTH (INCHES) | LEGEND FONTS |
|-----------------|----------------|----------------|--------------|
| INDEPENDENT USE | 1              | 24             | D            |
| INDEPENDENT USE | 2              | 30             | D            |
| GUIDE SIGN USE  | 1              | 30             | D            |
| GUIDE SIGN USE  | 2              | 36             | D            |

STATE LETTER ROUTE SHIELD

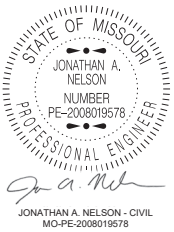


GENERAL NOTES:

- REFER TO STANDARD SPECIFICATION SEC 1042 FOR SHEETING AND SUBSTRATE DETAILS.
- FOR HOLE PUNCHING AND MOUNTING DETAILS, SEE OTHER DRAWINGS.
- FOR GENERAL SIGN DATA DETAILS, SEE OTHER DRAWINGS.
- THE MISSOURI SHAPE DETAIL MAY BE OBTAINED FROM THE HIGHWAY SAFETY AND TRAFFIC DIVISION OFFICE.
- GUIDE SIGN USE SHALL BE DIRECT APPLIED. POST MOUNTED USE SHALL BE APPLIED TO ALUMINUM SUBSTRATE.
- FOR NUMBERED ROUTES WITH MORE THAN 1 DIGIT THE LEGEND FONT MAY NEED TO BE REDUCED TO C OR B FONT.
- SEE MUTCD SHS FOR DETAILS FOR US AND INTERSTATE ROUTE SHIELDS.
- NONSTANDARD SHIELD SIZES MAY BE OBTAINED FROM THE HIGHWAY SAFETY AND TRAFFIC DIVISION OFFICE.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**  
105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

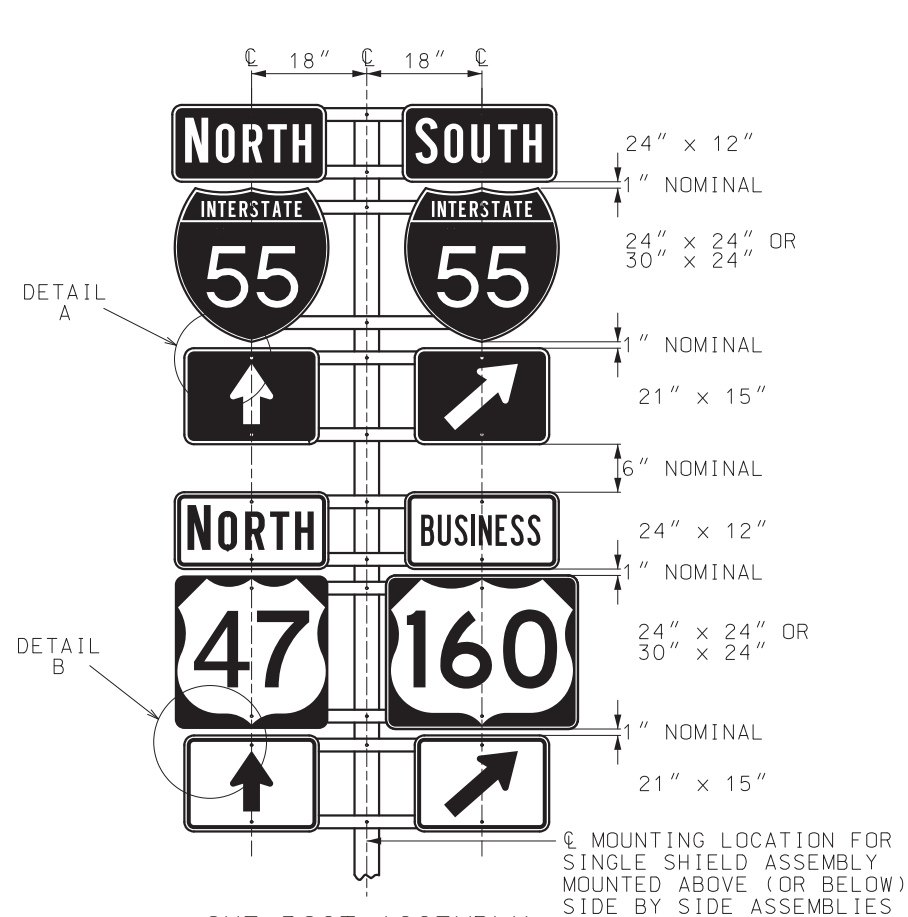


**HIGHWAY SIGNING**  
STANDARD SHIELDS FOR  
INDEPENDENT AND GUIDE  
SIGN USE

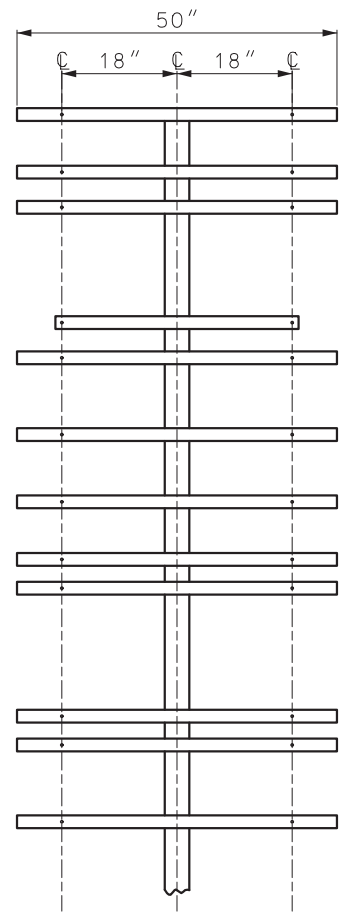
|                 |           |
|-----------------|-----------|
| DATE EFFECTIVE: | 1/1/2025  |
| DATE PREPARED:  | 10/4/2024 |

**903.02AQ**

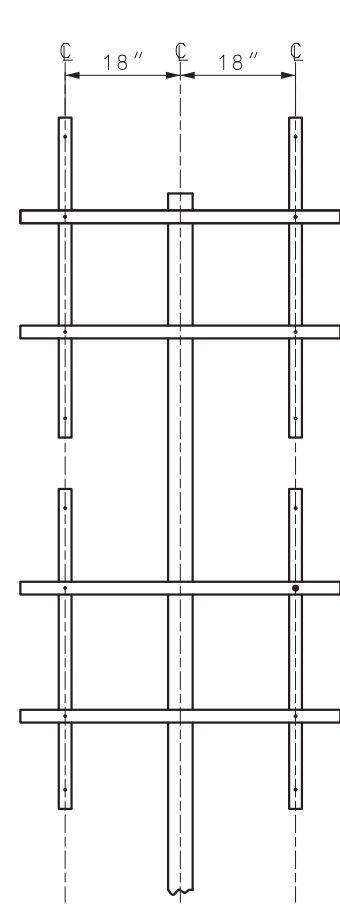
|           |
|-----------|
| SHEET NO. |
| 3 OF 8    |



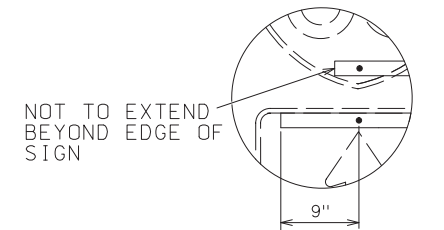
ONE POST ASSEMBLY  
USE TO SUPPORT UP TO 4 ROUTE MARKERS



STANDARD BACKING  
BAR LAYOUT



OPTIONAL BACKING  
BAR LAYOUT



DETAIL A  
SEE GENERAL NOTES



DETAIL B  
SEE GENERAL NOTES

GENERAL NOTES:

DETAIL A - THE END OF THE HORIZONTAL BACKING BARS SHALL EXTEND MAXIMUM OF 9 INCHES PAST THE SIGN BOLT, BUT SHALL NOT EXTEND PAST THE EDGE OF THE SIGN.

DETAIL B - FOR SIGNS INSTALLED ON TWO PARALLEL HORIZONTAL BACKING BARS, ONE ADDITIONAL BOLT SHALL BE ADDED TO THE LEFT SIGN TO KEEP ASSEMBLY SQUARE.

BACKING BARS SHALL MEET MISSOURI STANDARD PLANS OR APPROVED PRODUCTS LIST.

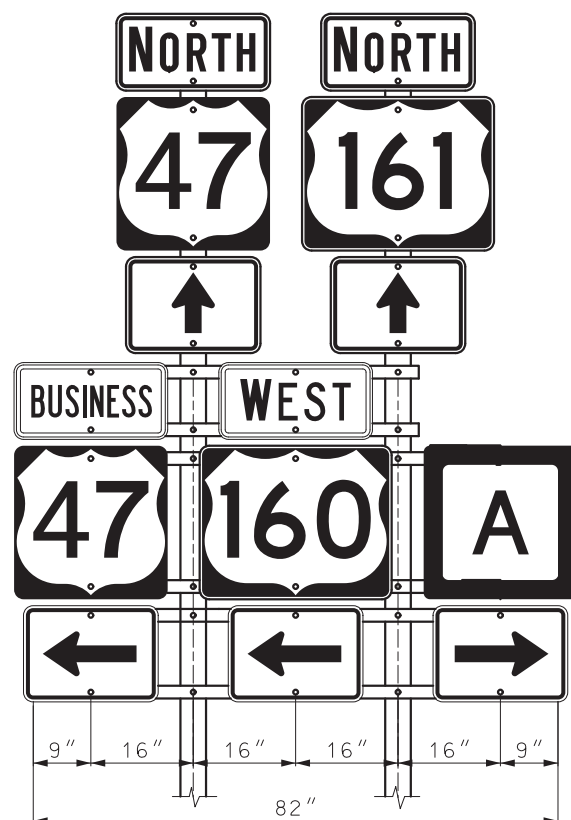
ALL BACKING BARS SHALL BE 2" x 3/8" STEEL, GALVANIZED AFTER PUNCHING. WEIGHT = 2.55 LBS. PER FOOT. HOLES IN BARS SHALL BE 3/8" AND SHALL BE PUNCHED AS SHOWN ON THIS DRAWING.

WHEN USING OPTIONAL BACKING BAR LAYOUT, VERTICAL BARS SHALL BE MOUNTED BEHIND HORIZONTAL BARS.

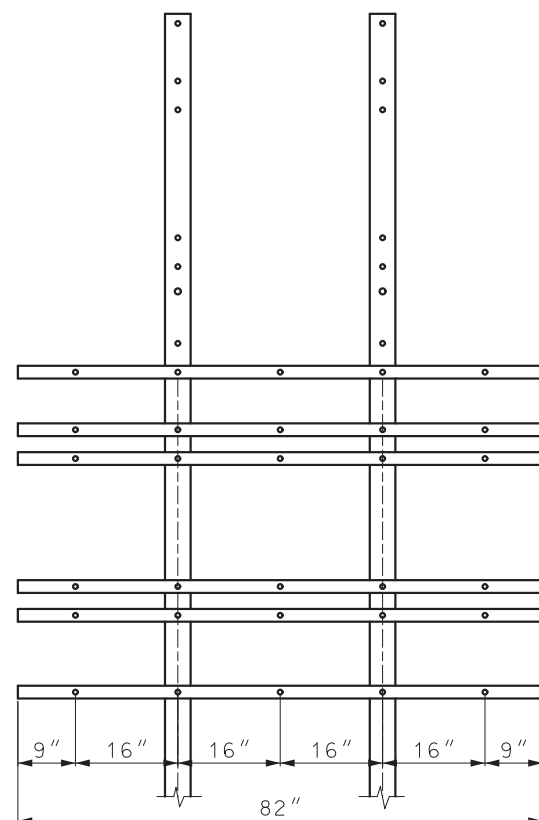
ALL SIGNS TO BE INSTALLED ALONG VERTICAL CENTERLINES.

FOR POST AND FOOTING DATA AND DETAILS OF SHIELDS AND PLAQUES, SEE OTHER DRAWINGS.

NOMINAL VERTICAL SPACING INDICATED BETWEEN SIGNS TO BE ACHIEVED BY USING THE CLOSEST AVAILABLE HOLES WHEN USING PSST.



TWO POST ASSEMBLY  
USE TO SUPPORT 5 OR 6 ROUTE MARKERS



STANDARD BACKING  
BAR LAYOUT

TWO POST ASSEMBLY NOTE:

OPTIONAL BACKING BAR LAYOUT MAY BE USED WITH TWO POST ASSEMBLY.

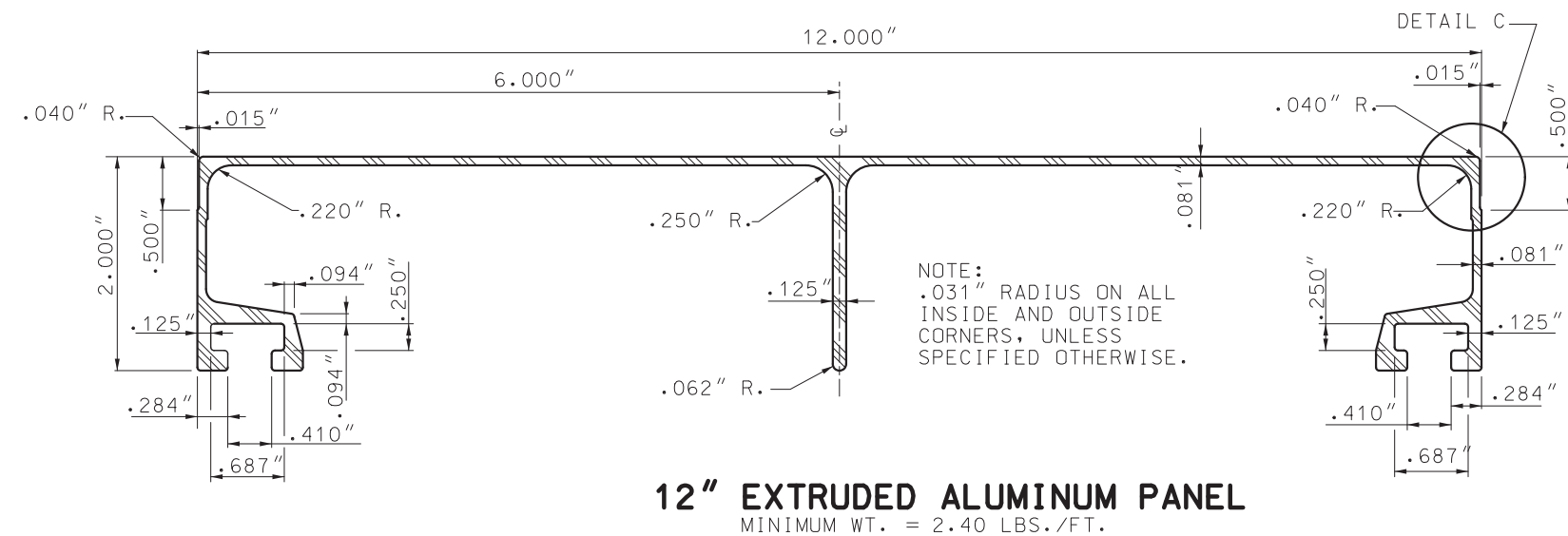
FOR 6 ROUTE SHIELD ASSEMBLY ADDITIONAL BACKING BARS ARE REQUIRED.

POST SELECTION:

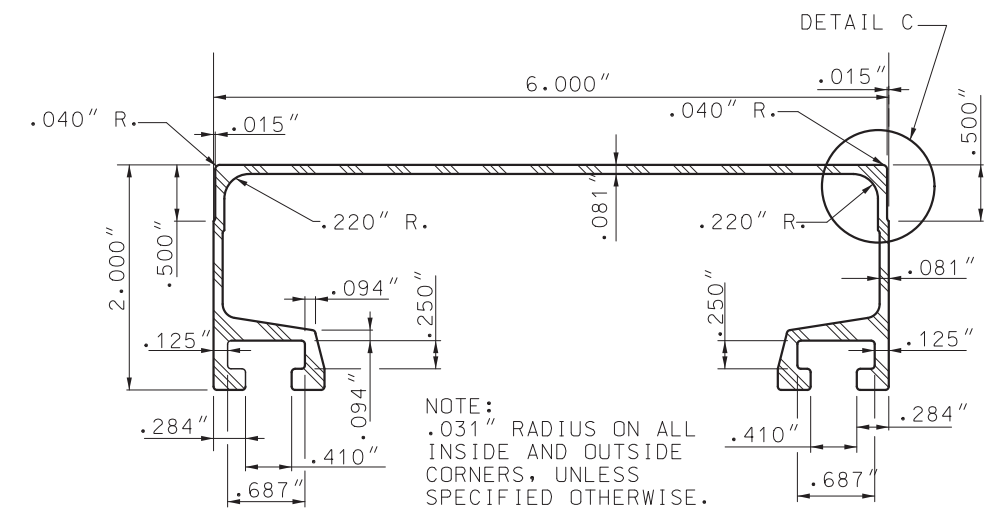
SINGLE POST ASSEMBLIES SHALL USE A 4" PIPE POST OR A 2 1/2" PSST POST.

TWO POST ASSEMBLIES SHALL USE TWO 4" PIPE POSTS OR TWO 2 1/2" PSST POSTS WITH 2 1/4" PSST INSERTS AND BREAKAWAYS. (SEE STANDARD PLAN 903.03)

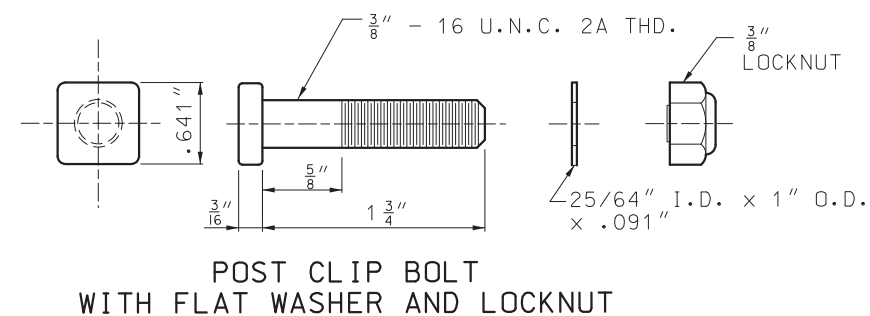
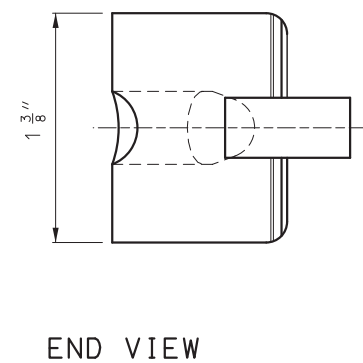
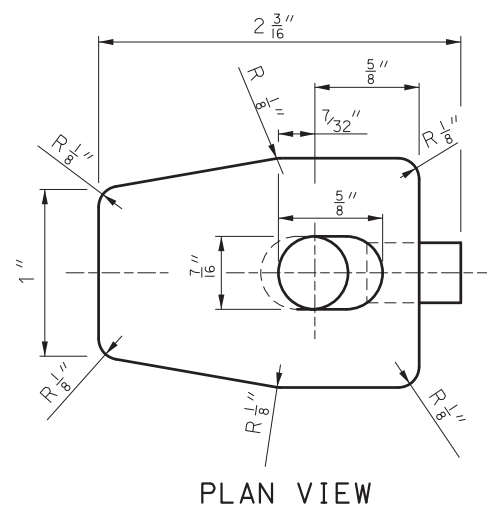
|                                                                                                                                                                                                                                  |                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                            |
| <br>JONATHAN A. NELSON - CIVIL<br>MO-PE-2008019578                                                                                          | <b>HIGHWAY SIGNING<br/>BACKING BARS<br/>SHEET SIGN MOUNTING<br/>ROUTE SHIELD AND<br/>MARKER ASSEMBLIES</b> |
| DATE EFFECTIVE: 1/1/2025<br>DATE PREPARED: 10/4/2024                                                                                                                                                                             | <b>903.02AQ</b><br>SHEET NO. 4 OF 8                                                                        |



NOTE:  
MINIMUM WEIGHT AND THICKNESS DIMENSIONS SHOWN.  
HEAVIER PANELS MAY BE USED.

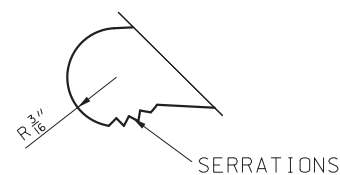
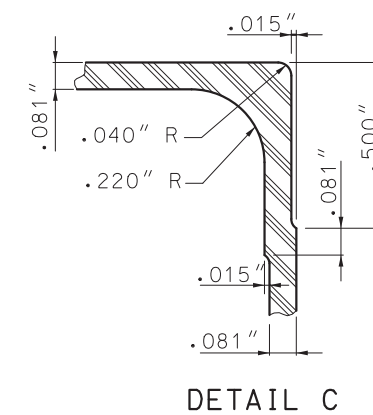


**6" EXTRUDED ALUMINUM PANEL**  
MINIMUM WT. = 2.40 LBS./FT.

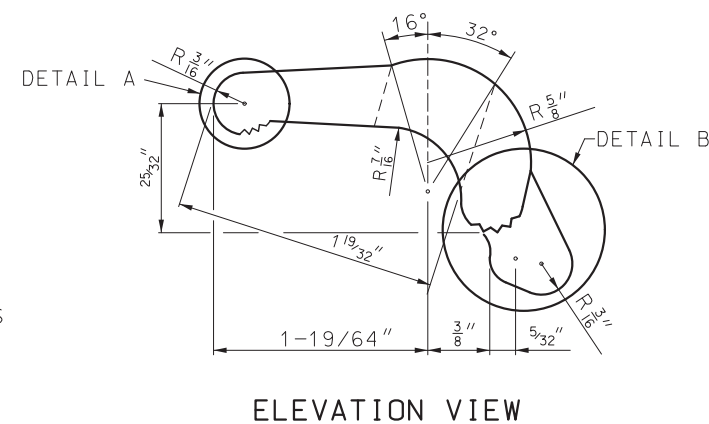


NOTE:  
SQUARE BOLT HEAD SHOWN.  
RECTANGULAR BOLT HEAD WITH  
LEAST DIMENSION OF .641" MAY  
BE USED.

BOLT - 1  $\frac{3}{4}$  x  $\frac{3}{8}$  ALUMINUM  
HEX LOCKNUT -  $\frac{3}{8}$ " ALUMINUM  
WASHER - ALUMINUM

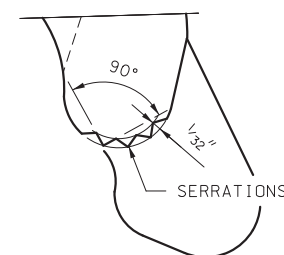


DETAIL A  
ENLARGED VIEW OF  
SERRATIONS



## POST CLIP

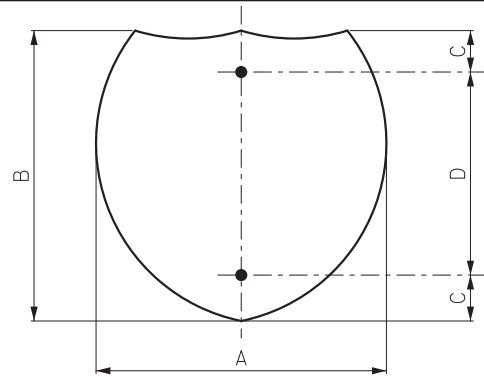
POST CLIPS SHALL BE ASTM B 108, 356-T6 ALUMINUM ALLOY.



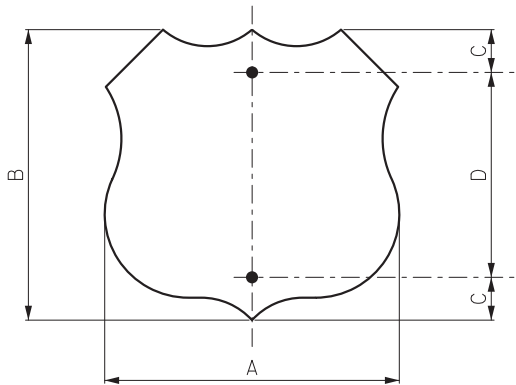
DETAIL B  
ENLARGED DETAIL OF SERRATIONS

SAW GATING AS SHOWN  
(APPROXIMATELY FLAT PERMISSIBLE)

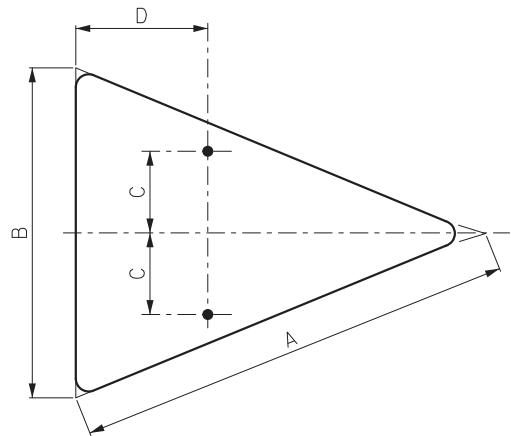
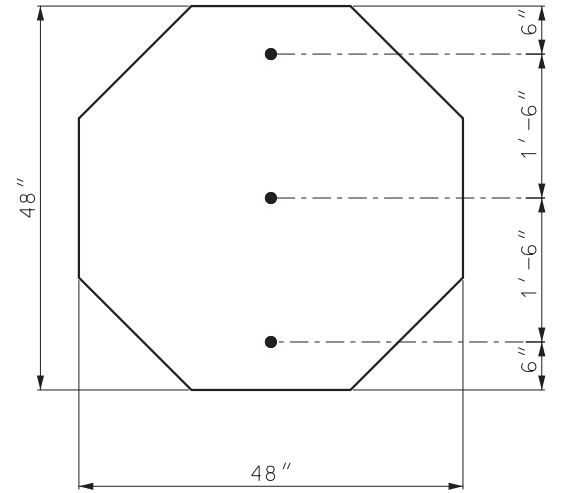
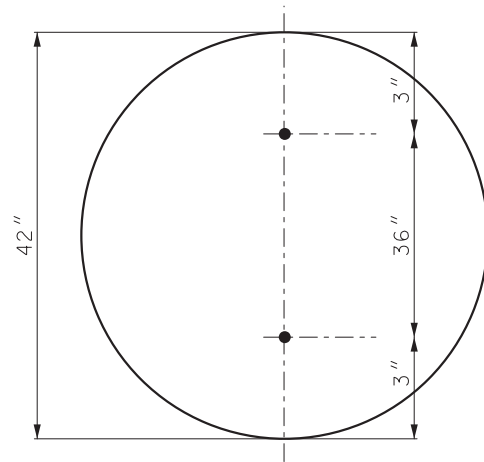
|                                                                                       |                                                                                  |  |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--|
|  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |  |
|                                                                                       | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |



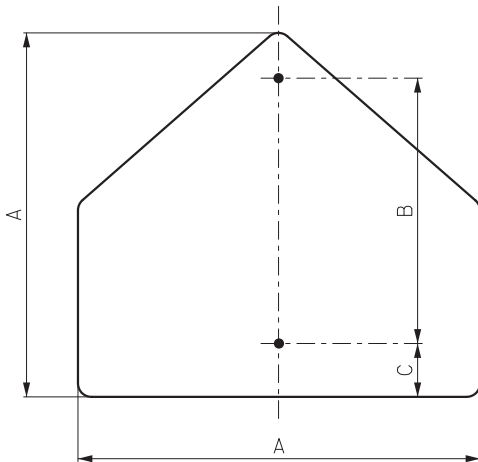
| DIMENSIONS (IN.) |    |   |    |
|------------------|----|---|----|
| A                | B  | C | D  |
| 24               | 24 | 3 | 18 |
| 30               | 24 | 3 | 18 |
| 36               | 36 | 6 | 24 |
| 45               | 36 | 6 | 24 |



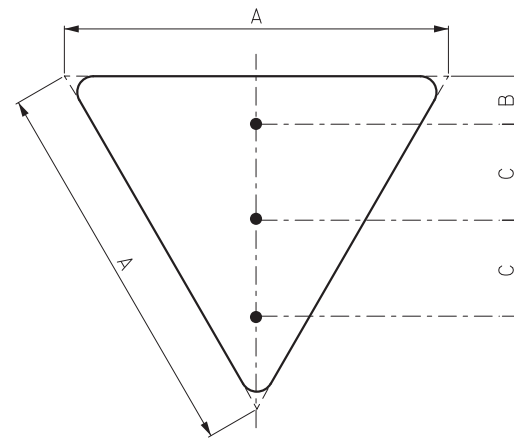
| DIMENSIONS (IN.) |    |   |    |
|------------------|----|---|----|
| A                | B  | C | D  |
| 24               | 24 | 3 | 18 |
| 30               | 24 | 3 | 18 |
| 36               | 36 | 6 | 24 |
| 45               | 36 | 6 | 24 |



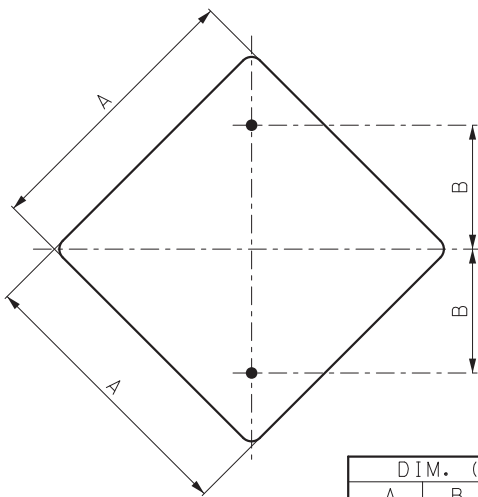
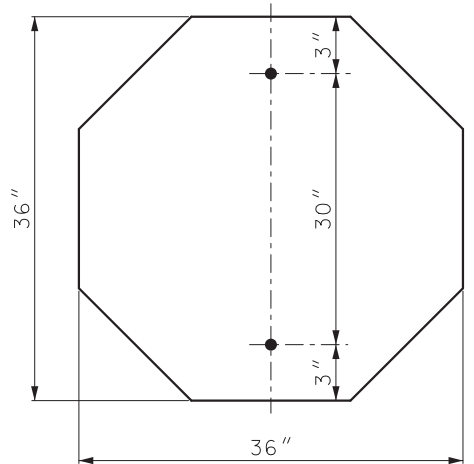
| DIMENSIONS (IN.) |    |     |    |        |
|------------------|----|-----|----|--------|
| A                | B  | C   | D  | RADIUS |
| 40               | 30 | 7.5 | 12 | 1.875  |
| 48               | 36 | 9   | 15 | 2.25   |



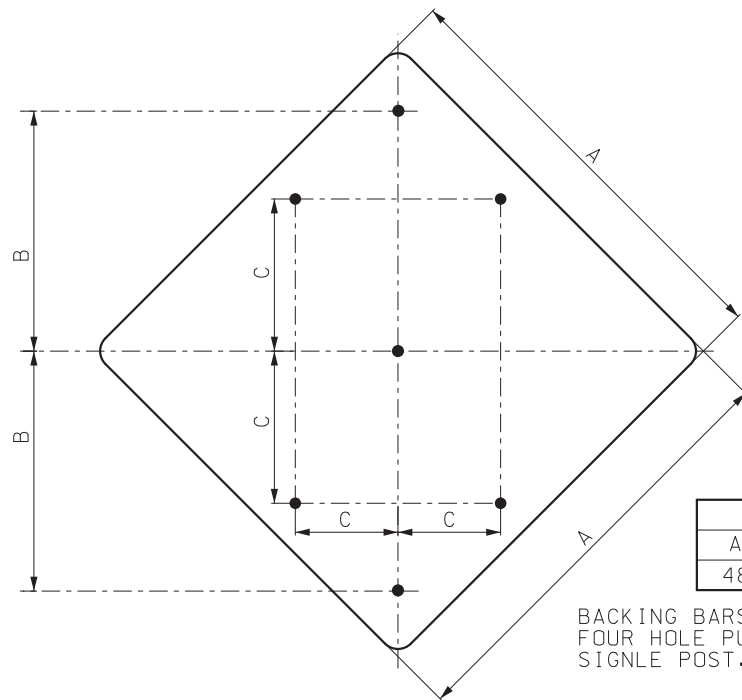
| DIMENSIONS (IN.) |    |   |        |
|------------------|----|---|--------|
| A                | B  | C | RADIUS |
| 36               | 24 | 3 | 2.25   |



| DIMENSIONS (IN.) |   |    |        |
|------------------|---|----|--------|
| A                | B | C  | RADIUS |
| 48               | 6 | 12 | 3      |
| 60               | 8 | 15 | 4      |



| DIM. (IN.) |    |        |
|------------|----|--------|
| A          | B  | RADIUS |
| 18         | 9  | 1.5    |
| 24         | 12 | 1.5    |
| 30         | 15 | 1.875  |
| 36         | 18 | 2.25   |



| DIMENSIONS (IN.) |    |    |        |
|------------------|----|----|--------|
| A                | B  | C  | RADIUS |
| 48               | 24 | 15 | 3      |

BACKING BARS ONLY REQUIRED FOR FOUR HOLE PUNCH INSTALLATION ON SIGNLE POST.

#### GENERAL NOTES:

SIGNS WITH FOUR OR MORE HOLES REQUIRE BACKING BARS OR MULTIPLE POSTS.

HOLES IN SIGNS SHALL BE  $\frac{3}{8}$ " AND PUNCHED AS SHOWN ON THIS DRAWING.

FLAT SHEET FOR SIGNS SHALL BE THE FOLLOWING THICKNESS:

9 SQUARE FEET OF LESS = 0.080 IN.

OVER 9 BUT UNDER 16 SQUARE FEET = 0.100 IN.

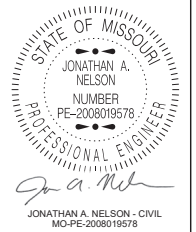
16 SQUARE FEET OR LARGER = 0.125 IN.

FOR MOUNTING DETAILS, SEE OTHER DRAWINGS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**HIGHWAY SIGNING**

**HOLE PUNCHING**

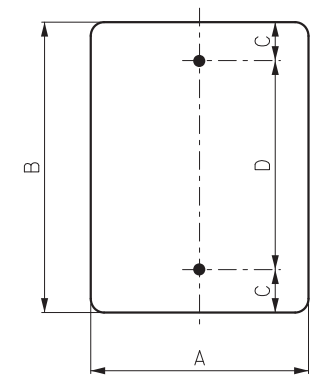
DATE EFFECTIVE: 1/1/2025

DATE PREPARED: 10/4/2024

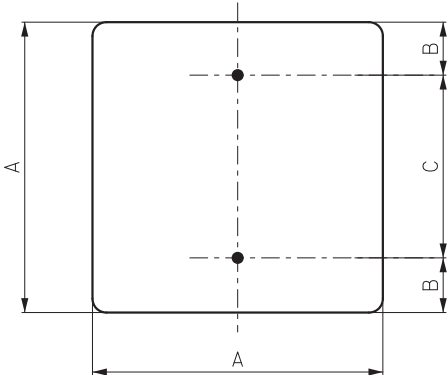
**903.02AQ**

SHEET NO.

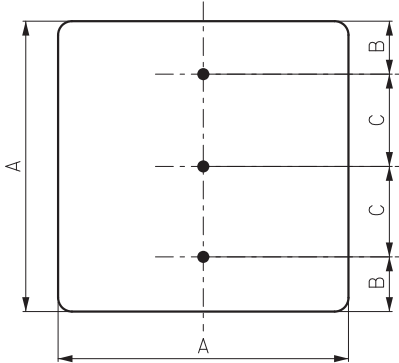
6 OF 8



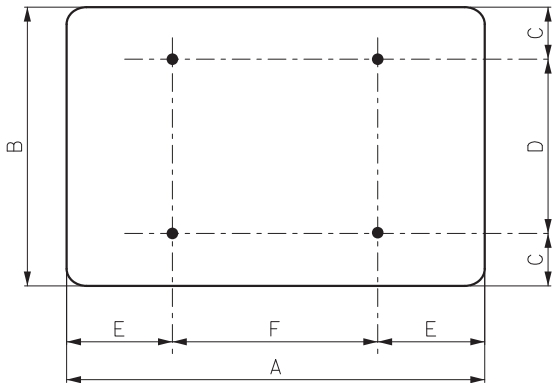
| DIMENSIONS (IN.) |    |      |      |        |
|------------------|----|------|------|--------|
| A                | B  | C    | D    | RADIUS |
| 4                | 16 | 0.75 | 14.5 | SQ     |
| 6                | 12 | 1.5  | 9    | 1      |
| 9                | 12 | 3.5  | 5    | 1.5    |
| 9                | 15 | 3.75 | 7.5  | 1.5    |
| 12               | 18 | 3    | 12   | 1.5    |
| 12               | 24 | 3    | 18   | 1.5    |
| 12               | 36 | 3    | 30   | 1.5    |
| 12               | 48 | 3    | 42   | 1.5    |
| 15               | 21 | 3    | 15   | 1.5    |
| 18               | 24 | 3    | 18   | 1.5    |
| 24               | 30 | 3    | 24   | 1.5    |
| 24               | 36 | 3    | 30   | 1.5    |
| 30               | 36 | 3    | 30   | 1.875  |
| 30               | 42 | 3    | 36   | 1.875  |
| 30               | 48 | 6    | 36   | 1.875  |



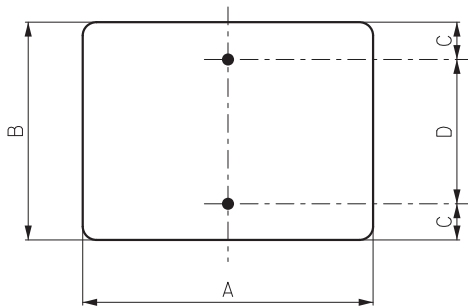
| DIMENSIONS (IN.) |     |    |        |
|------------------|-----|----|--------|
| A                | B   | C  | RADIUS |
| 12               | 1.5 | 9  | 1.5    |
| 18               | 3   | 12 | 1.5    |
| 24               | 3   | 18 | 1.5    |
| 30               | 3   | 24 | 1.875  |
| 36               | 6   | 24 | 2.25   |



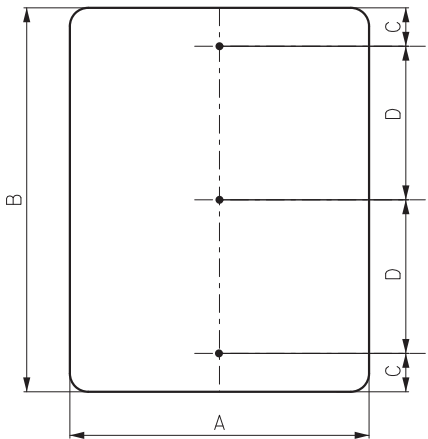
| DIMENSIONS (IN.) |   |    |        |
|------------------|---|----|--------|
| A                | B | C  | RADIUS |
| 48               | 6 | 18 | 3      |



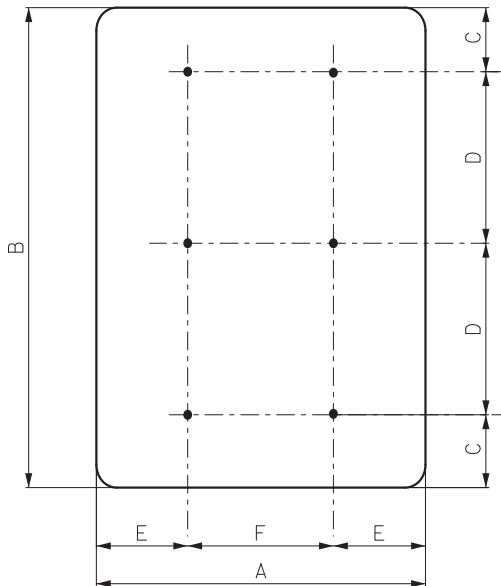
| DIMENSIONS (IN.) |    |     |    |    |    |        |
|------------------|----|-----|----|----|----|--------|
| A                | B  | C   | D  | E  | F  | RADIUS |
| 48               | 12 | 1.5 | 9  | 9  | 30 | 1.5    |
| 48               | 18 | 1.5 | 15 | 9  | 30 | 1.5    |
| 48               | 24 | 3   | 18 | 9  | 30 | 1.5    |
| 48               | 30 | 3   | 24 | 9  | 30 | 1.875  |
| 48               | 36 | 6   | 24 | 9  | 30 | 2.25   |
| 54               | 18 | 1.5 | 15 | 9  | 36 | 1.5    |
| 60               | 12 | 1.5 | 9  | 12 | 36 | 1.5    |
| 60               | 18 | 1.5 | 15 | 12 | 36 | 1.5    |
| 60               | 24 | 3   | 18 | 12 | 36 | 1.5    |
| 60               | 30 | 3   | 24 | 12 | 36 | 1.875  |
| 60               | 36 | 6   | 24 | 12 | 36 | 2.25   |
| 60               | 48 | 6   | 36 | 12 | 36 | 3      |
| 72               | 36 | 6   | 24 | 12 | 48 | 2.25   |
| 72               | 48 | 6   | 36 | 12 | 48 | 3      |



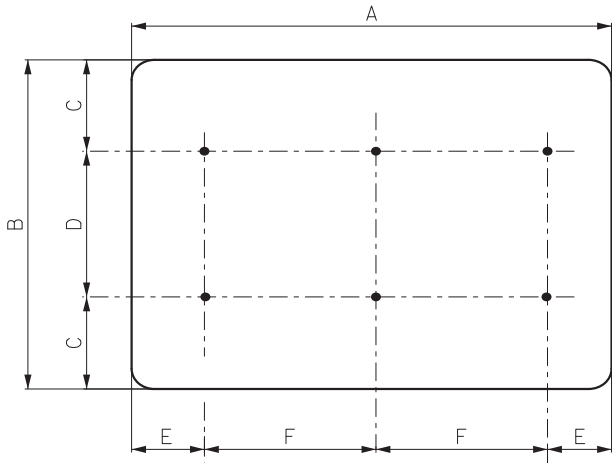
| DIMENSIONS (IN.) |    |     |    |        |
|------------------|----|-----|----|--------|
| A                | B  | C   | D  | RADIUS |
| 4                | 5  | 1.5 | 2  | 1.5    |
| 12               | 9  | 1.5 | 6  | 1.5    |
| 18               | 9  | 1.5 | 6  | 1.5    |
| 18               | 12 | 1.5 | 9  | 1.5    |
| 21               | 15 | 1.5 | 12 | 1.5    |
| 24               | 8  | 1.5 | 5  | 1.5    |
| 24               | 12 | 1.5 | 9  | 1.5    |
| 24               | 18 | 3   | 12 | 1.5    |
| 30               | 8  | 1.5 | 5  | 1.5    |
| 30               | 12 | 1.5 | 9  | 1.5    |
| 30               | 18 | 3   | 12 | 1.5    |
| 30               | 24 | 3   | 18 | 1.5    |
| 36               | 8  | 1.5 | 5  | 1.5    |
| 36               | 12 | 1.5 | 9  | 1.5    |
| 36               | 18 | 3   | 12 | 1.5    |
| 36               | 24 | 3   | 18 | 1.5    |
| 36               | 30 | 3   | 24 | 1.875  |
| 42               | 8  | 1.5 | 5  | 1.5    |
| 42               | 18 | 3   | 12 | 1.5    |
| 42               | 24 | 3   | 18 | 1.5    |
| 42               | 30 | 3   | 24 | 1.875  |
| 42               | 36 | 3   | 30 | 2.25   |
| 48               | 8  | 1.5 | 5  | 1.5    |



| DIMENSIONS (IN.) |    |   |    |        |
|------------------|----|---|----|--------|
| A                | B  | C | D  | RADIUS |
| 4                | 72 | 6 | 30 | SQ     |
| 12               | 72 | 6 | 30 | 1.5    |
| 18               | 60 | 6 | 24 | 1.5    |
| 24               | 48 | 6 | 18 | 1.5    |
| 36               | 48 | 6 | 18 | 2.25   |
| 36               | 60 | 6 | 24 | 2.25   |
| 36               | 72 | 6 | 30 | 2.25   |

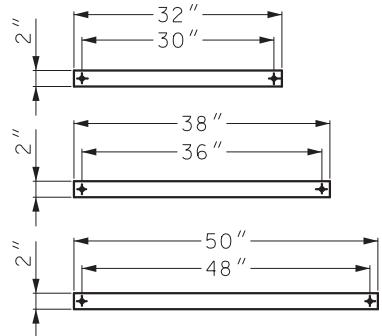


| DIMENSIONS (IN.) |    |   |    |   |    |        |
|------------------|----|---|----|---|----|--------|
| A                | B  | C | D  | E | F  | RADIUS |
| 48               | 60 | 6 | 24 | 9 | 30 | 3      |
| 48               | 72 | 6 | 30 | 9 | 30 | 3      |
| 48               | 84 | 6 | 36 | 9 | 30 | 3      |
| 48               | 96 | 6 | 42 | 9 | 30 | 3      |



| DIMENSIONS (IN.) |    |   |    |    |    |        |
|------------------|----|---|----|----|----|--------|
| A                | B  | C | D  | E  | F  | RADIUS |
| 84               | 24 | 3 | 18 | 12 | 30 | 3      |
| 96               | 48 | 6 | 36 | 16 | 32 | 3      |

| DIMENSIONS (IN.)<br>FOR SIGNS REQUIRING<br>NO HOLE PUNCHING |    |        |
|-------------------------------------------------------------|----|--------|
| A                                                           | B  | RADIUS |
| 66                                                          | 18 | 1.5    |
| 72                                                          | 18 | 1.5    |
| 78                                                          | 18 | 1.5    |
| 84                                                          | 18 | 1.5    |
| 90                                                          | 18 | 1.5    |
| 96                                                          | 18 | 1.5    |
| 36                                                          | 78 | 2.25   |



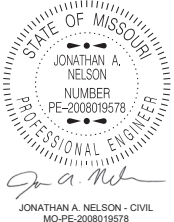
BACKING BARS FOR SINGLE POST SIGNS

GENERAL NOTES:  
REFER TO GENERAL NOTES ON SHEET 6 OF 8.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**HIGHWAY SIGNING**  
**HOLE PUNCHING**

DATE EFFECTIVE: 1/1/2025  
DATE PREPARED: 10/4/2024

**903.02AQ**

SHEET NO.  
7 OF 8





STRUCTURAL STEEL POST FOR GROUND MOUNTED SIGNS

| POST     |                         | BOLT |        |         | WASHER  |       |       | BASE CONNECTION DATA TABLE (IN.) |       |       |       |       |     |     |      |       |     |
|----------|-------------------------|------|--------|---------|---------|-------|-------|----------------------------------|-------|-------|-------|-------|-----|-----|------|-------|-----|
| DES. NO. | NOM SIZE (IN. X LBS/FT) | DIA  | LENGTH | TORQUE  | OD      | ID    | THICK | A                                | B     | C     | D     | E     | F   | G   | W    | R     |     |
|          |                         | IN.  | IN.    | IN./LB. |         |       |       |                                  |       |       |       |       |     |     |      |       | IN. |
| 1        | W6x9                    | 5/8  | 2 3/4  | 345     | 1 5/16  | 11/16 | 1/8   | 5                                | 2     | 1 1/4 | 2 3/4 | 1 1/8 | 3/4 | 1/2 | 1/4  | 11/32 |     |
|          |                         |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |
|          |                         |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |
| 2        | W6x15                   | 3/4  | 3 1/2  | 555     | 1 15/32 | 13/16 | 1/8   | 6                                | 2 1/4 | 1 3/8 | 3 1/2 | 1 1/4 | 1   | 3/4 | 5/16 | 13/32 |     |
|          |                         |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |
|          |                         |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |
| 3        | W8x18                   |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |
| 4        | W10x22                  |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |
| 5        | W10x26                  |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |
| 6        | W12x35                  |      |        |         |         |       |       |                                  |       |       |       |       |     |     |      |       |     |

POST AND FOOTING DATA TABLE

| POST          |           | FOOTING |        |             |      |              |      |           |      |           |      |                  |      |
|---------------|-----------|---------|--------|-------------|------|--------------|------|-----------|------|-----------|------|------------------|------|
| POST DES. NO. | NOM. SIZE | WEIGHT  |        | STUB LENGTH | DIA. | LEVEL GROUND |      | 6:1 GRADE |      | 4:1 GRADE |      | 3:1 OR 2:1 GRADE |      |
|               |           | LBS/FT  | LBS/IN |             |      | DEPTH        | C.Y. | DEPTH     | C.Y. | DEPTH     | C.Y. | DEPTH            | C.Y. |
| 1             | W6        | 9.0     | 0.75   | 3'-0"       | 15"  | 3'-0"        | 0.14 | 3'-2"     | 0.15 | 3'-3"     | 0.16 | 3'-6"            | 0.17 |
| 2             | W6        | 15.0    | 1.25   | 4'-0"       | 24"  | 4'-0"        | 0.47 | 4'-2"     | 0.50 | 4'-3"     | 0.51 | 4'-6"            | 0.54 |
| 3             | W8        | 18.0    | 1.50   | 4'-6"       | 28"  | 4'-6"        | 0.71 | 4'-8"     | 0.73 | 4'-9"     | 0.74 | 5'-0"            | 0.78 |
| 4             | W10       | 22.0    | 1.83   | 5'-0"       | 36"  | 5'-0"        | 1.31 | 5'-2"     | 1.36 | 5'-3"     | 1.39 | 5'-6"            | 1.45 |
| 5             | W10       | 26.0    | 2.17   | 5'-0"       | 36"  | 5'-0"        | 1.31 | 5'-3"     | 1.37 | 5'-5"     | 1.43 | 5'-9"            | 1.52 |
| 6             | W12       | 35.0    | 2.92   | 5'-6"       | 36"  | 5'-6"        | 1.44 | 5'-9"     | 1.52 | 5'-11"    | 1.56 | 6'-3"            | 1.65 |

SHEET METAL BOLT RETAINER CUT FROM 30 GAGE GALVANIZED SHEET METAL. PLACE BETWEEN BASE PLATES. SIZE VARIES TO FIT PLATE. BOLT HOLES TO BE 1/16" LARGER THAN REQUIRED BOLT SIZE.

BOLT RETAINER

SHIM

SECTION A-A

STIFFENER PLATE

ELEVATION

SECTION B-B

FOOTING DETAIL

DETAIL A

GENERAL NOTES:

DESIGN SPECS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS - 1985 (EXCEPT 2001 AND LATEST INTERIMS FOR STRUCTURAL STEEL POSTS).

POSTS, PERFORATED FUSE PLATE AND SPLICE PLATE TO BE GALVANIZED AFTER FABRICATION.

METAL PROJECTING BEYOND THE PLANE OF THE PLATE FACE WILL NOT BE ALLOWED.

REMOVE ALL GALVANIZING RUNS OR BEADS IN THE WASHER AREA.

ALL STRUCTURAL STEEL STIFFENER PLATES AND BASE PLATES, FOR GROUND MOUNTED SIGNS SHALL MEET THE REQUIREMENTS OF ASTM A 36 OR AASHTO M 270 GRADE 50, MINIMUM YIELD 50,000 PSI.

IN THE EVENT THE DISTANCE BETWEEN THE TOP OF THE FOOTING AND THE BOTTOM OF THE SIGN IS LESS THAN 7'-9", THE SIGN HEIGHT AND POST LENGTH IS TO BE INCREASED SUFFICIENTLY TO ACCOMMODATE THIS MINIMUM SPACING.

HINGE PLATES NOT REQUIRED ON SINGLE POST SIGNS OR ANY SIGNS USING PIPE POSTS.

NUTS ON HINGE PLATE BOLTS SHALL BE TIGHTENED TO THE REQUIRED MINIMUM BOLT TENSION VALUES SHOWN IN TABLE 1 SEC. 1080 OF THE STANDARD SPECIFICATIONS.

THE NUT SHALL BE FREE RUNNING. IF THE NUT WILL NOT SPIN ON THE BOLT BECAUSE OF GALVANIZING IRREGULARITIES, A LUBRICANT SHALL BE APPLIED.

ALL BREAKAWAY ASSEMBLY BOLTS SHALL BE TIGHTENED IN A SYSTEMATIC MANNER TO THE PRESCRIBED TORQUE SHOWN ON THIS DRAWING.

EACH BREAKAWAY ASSEMBLY BOLT SHALL BE LOOSENED AND RE-TIGHTENED TO THE REQUIRED TORQUE IN THE SAME ORDER AS THE INITIAL TIGHTENING.

THE THREADS SHALL BE BURRED AT THE NUT USING A CENTER PUNCH TO PREVENT NUT FROM LOOSENING.

POST LENGTH QUANTITY SHOWN ON PLANS INCLUDES STUB.

1" X 2 1/2" HIGH STRENGTH BOLTS FOR PIPE POSTS SHALL BE OF THE DESIGNATION AASHTO M 164 OR ASTM A 449. ALL OTHER HIGH STRENGTH BOLTS SHALL BE OF THE DESIGNATION ASTM F3125 GRADE A325.

FURNISH TWO .012"± AND TWO .0032"± THICK SHIMS PER POST FROM BRASS SHIM STOCK OR STRIP, DESIGNATION ASTM B 36. SHIM AS REQUIRED TO PLUMB POST.

HIGH STRENGTH BOLTS WITH HEX NUT AND THREE WASHERS WITH EACH BOLT ARE TO BE GALVANIZED.

OPTIONAL HOLES (13/16" ROUND FOR "I" SHAPE POSTS AND 9/16" ROUND FOR PIPE POST BASE PLATES) AS SHOWN IN "ELEVATIONS" ARE TO BE USED AS AID FOR GALVANIZING ONLY.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

POST INSTALLATION DETAILS  
POST AND FOOTING DETAILS  
WIDE FLANGE (WF) POSTS

DATE EFFECTIVE: 10/1/2025  
DATE PREPARED: 7/7/2025

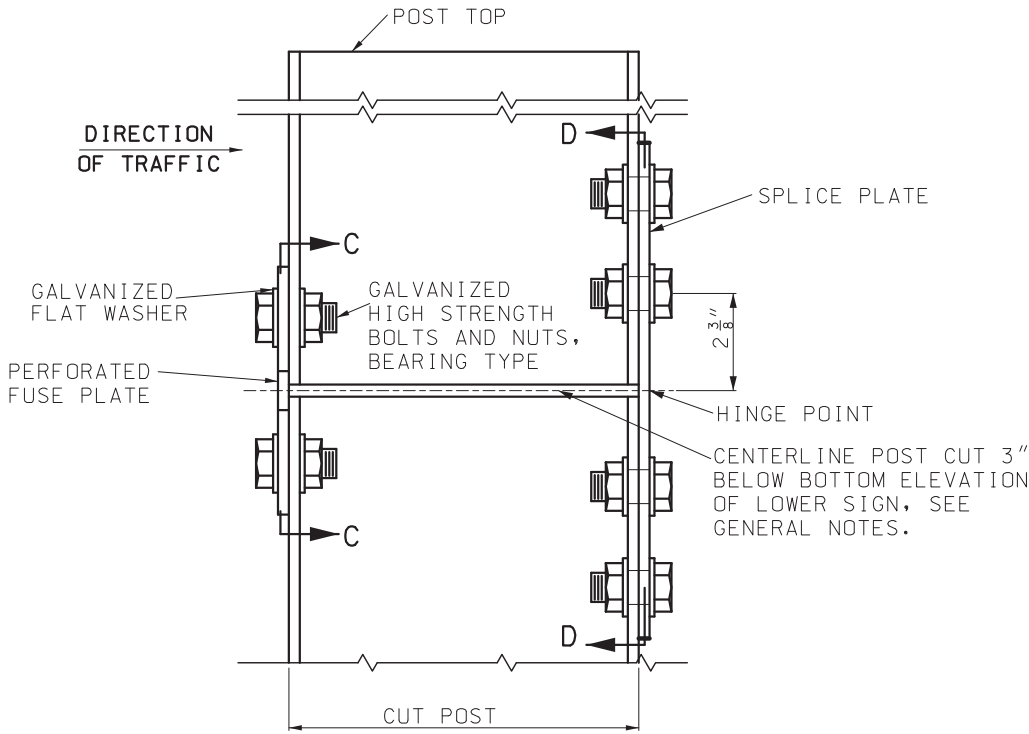
903.03BU

SHEET NO.  
1 OF 12

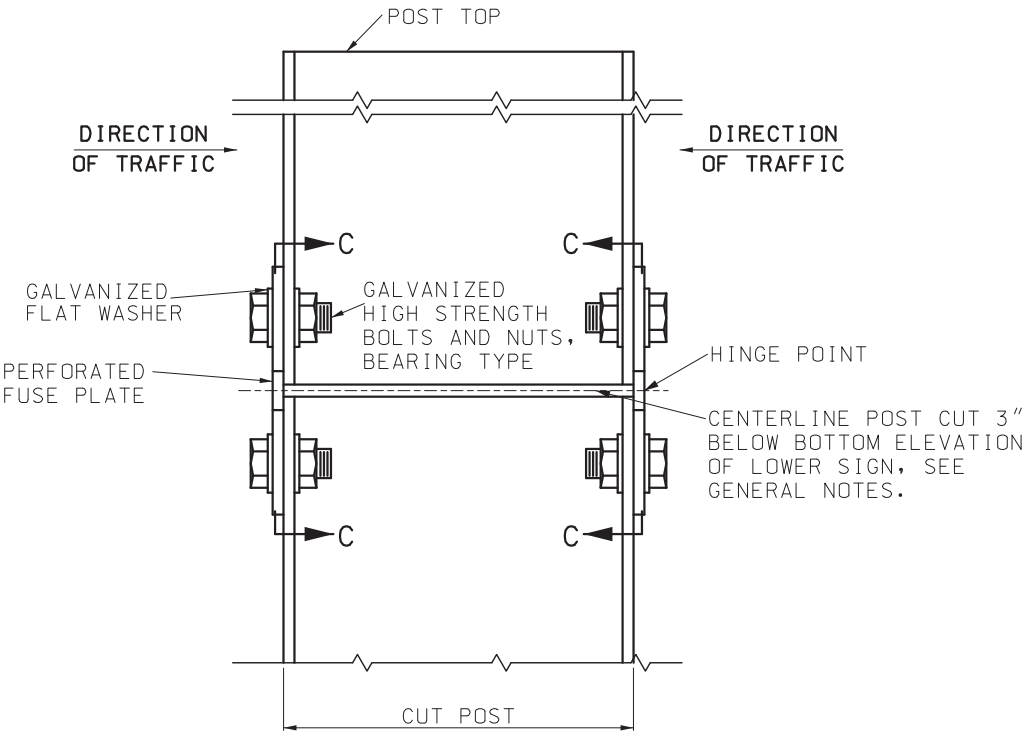


| WIDE FLANGE STRUCTURAL STEEL POSTS DESIGN DATA |                       |        |       |                                |                               |                              |                              | PERFORATED FUSE PLATE DATA TABLE |                               |                               |                               |                               |                               |                               |                               |                               |                               |                                |                              |                             |                        |                       |                               | SPLICE PLATE DATA TABLE       |                               |                              |                               |                             |                        |                                 |                               |                             |  |  |
|------------------------------------------------|-----------------------|--------|-------|--------------------------------|-------------------------------|------------------------------|------------------------------|----------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|------------------------------|-----------------------------|------------------------|-----------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|-----------------------------|------------------------|---------------------------------|-------------------------------|-----------------------------|--|--|
| POST<br>DES.<br>NO.                            | NOM.<br>SIZE<br>(IN.) | WEIGHT |       | DEPTH<br>(IN.)                 | FLANGE                        |                              | WEB<br>THICK<br>(IN.)        | POST<br>DESIGN<br>NO.            | F<br>(IN.)                    | G<br>(IN.)                    | H<br>(IN.)                    | J<br>(IN.)                    | K<br>(IN.)                    | L<br>(IN.)                    | M<br>(IN.)                    | N<br>(IN.)                    | d1<br>(IN.)                   | d2<br>(IN.)                    | P<br>(IN.)                   | BOLT<br>DIA.<br>(IN.)       | WT.<br>(EA.)<br>(LBS.) | POST<br>DESIGN<br>NO. | J<br>(IN.)                    | K<br>(IN.)                    | L<br>(IN.)                    | U<br>(IN.)                   | d1<br>(IN.)                   | BOLT<br>DIA.<br>(IN.)       | WT.<br>(EA.)<br>(LBS.) | WASHER                          |                               |                             |  |  |
|                                                |                       | LB/FT  | LB/IN |                                | WIDTH<br>(IN.)                | THICK<br>(IN.)               |                              |                                  |                               |                               |                               |                               |                               |                               |                               |                               |                               |                                |                              |                             |                        |                       |                               |                               |                               |                              |                               |                             |                        | OD<br>IN.                       | ID<br>IN.                     | THICK<br>IN.                |  |  |
| 1                                              | W6                    | 9      | 0.75  | 5 <sup>7</sup> / <sub>8</sub>  | 4                             | <sup>3</sup> / <sub>16</sub> | <sup>3</sup> / <sub>16</sub> | 1                                | 4 <sup>1</sup> / <sub>4</sub> | 1                             | 1 <sup>1</sup> / <sub>8</sub> | 4                             | 2 <sup>1</sup> / <sub>4</sub> | <sup>7</sup> / <sub>8</sub>   | 1                             | <sup>1</sup> / <sub>2</sub>   | <sup>9</sup> / <sub>16</sub>  | <sup>3</sup> / <sub>4</sub>    | <sup>3</sup> / <sub>16</sub> | <sup>1</sup> / <sub>2</sub> | 0.76                   | 1                     | 4                             | 2 <sup>1</sup> / <sub>4</sub> | <sup>7</sup> / <sub>8</sub>   | <sup>3</sup> / <sub>16</sub> | <sup>9</sup> / <sub>16</sub>  | <sup>1</sup> / <sub>2</sub> | 2.45                   | 1 <sup>3</sup> / <sub>16</sub>  | <sup>5</sup> / <sub>8</sub>   | <sup>1</sup> / <sub>8</sub> |  |  |
| 2                                              | W6                    | 15     | 1.25  | 6                              | 6                             | <sup>1</sup> / <sub>4</sub>  | <sup>1</sup> / <sub>4</sub>  | 2                                | 5                             | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 6                             | 3 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>4</sub>   | <sup>11</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>4</sub>  | <sup>1</sup> / <sub>4</sub>  | <sup>5</sup> / <sub>8</sub> | 1.67                   | 2                     | 6                             | 3 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>4</sub> | <sup>1</sup> / <sub>4</sub>  | <sup>11</sup> / <sub>16</sub> | <sup>5</sup> / <sub>8</sub> | 4.89                   | 1 <sup>5</sup> / <sub>16</sub>  | <sup>11</sup> / <sub>16</sub> | <sup>1</sup> / <sub>8</sub> |  |  |
| 3                                              | W8                    | 18     | 1.50  | 8 <sup>1</sup> / <sub>8</sub>  | 5 <sup>1</sup> / <sub>4</sub> | <sup>5</sup> / <sub>16</sub> | <sup>1</sup> / <sub>4</sub>  | 3                                | 5                             | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 5 <sup>1</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | <sup>3</sup> / <sub>4</sub>   | <sup>11</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>16</sub> | <sup>1</sup> / <sub>4</sub>  | <sup>5</sup> / <sub>8</sub> | 1.51                   | 3                     | 5 <sup>1</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | <sup>5</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>5</sup> / <sub>8</sub> | 5.32                   | 1 <sup>15</sup> / <sub>32</sub> | <sup>13</sup> / <sub>16</sub> | <sup>1</sup> / <sub>8</sub> |  |  |
| 4                                              | W10                   | 22     | 1.83  | 10 <sup>1</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | <sup>3</sup> / <sub>8</sub>  | <sup>1</sup> / <sub>4</sub>  | 4                                | 6                             | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 5 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>3</sup> / <sub>8</sub> | <sup>13</sup> / <sub>16</sub> | <sup>13</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>8</sub>  | <sup>5</sup> / <sub>16</sub> | <sup>3</sup> / <sub>4</sub> | 2.52                   | 4                     | 5 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | <sup>5</sup> / <sub>16</sub> | <sup>13</sup> / <sub>16</sub> | <sup>3</sup> / <sub>4</sub> | 5.75                   |                                 |                               |                             |  |  |
| 5                                              | W10                   | 26     | 2.17  | 10 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | <sup>7</sup> / <sub>16</sub> | <sup>1</sup> / <sub>4</sub>  | 5                                | 6                             | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 5 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>3</sup> / <sub>8</sub> | <sup>13</sup> / <sub>16</sub> | <sup>13</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>8</sub>  | <sup>5</sup> / <sub>16</sub> | <sup>3</sup> / <sub>4</sub> | 2.52                   | 5                     | 5 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | <sup>7</sup> / <sub>16</sub> | <sup>13</sup> / <sub>16</sub> | <sup>3</sup> / <sub>4</sub> | 8.04                   |                                 |                               |                             |  |  |
| 6                                              | W12                   | 35     | 2.92  | 12 <sup>1</sup> / <sub>2</sub> | 6 <sup>1</sup> / <sub>2</sub> | <sup>1</sup> / <sub>2</sub>  | <sup>5</sup> / <sub>16</sub> | 6                                | 6                             | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 6 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>5</sup> / <sub>8</sub> | <sup>13</sup> / <sub>16</sub> | <sup>13</sup> / <sub>16</sub> | 1 <sup>5</sup> / <sub>16</sub> | <sup>3</sup> / <sub>8</sub>  | <sup>3</sup> / <sub>4</sub> | 3.35                   | 6                     | 6 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | <sup>1</sup> / <sub>2</sub>  | <sup>13</sup> / <sub>16</sub> | <sup>3</sup> / <sub>4</sub> | 10.47                  |                                 |                               |                             |  |  |

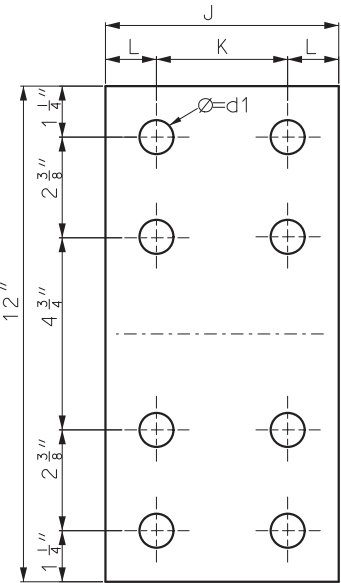
THE WEIGHT OF STRUCTURAL STEEL POSTS SHOWN IN THE CONTRACT HAS BEEN COMPUTED USING THE WEIGHTS SHOWN.



ONE DIRECTION BREAKAWAY

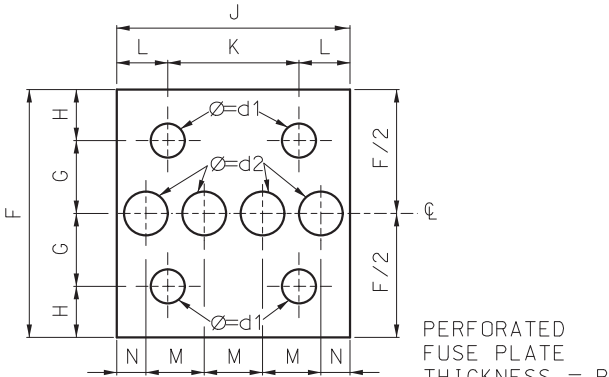


TWO DIRECTION BREAKAWAY



SPLICE PLATE THICKNESS = U

ELEVATION D-D



ELEVATION C-C

ALL HOLES SHALL BE DRILLED. ALL PLATE CUTS SHALL PREFERABLY BE SAW CUTS. HOWEVER: FLAME CUTTING WILL BE PERMITTED PROVIDED ALL EDGES ARE GROUND.

PERFORATED FUSE PLATE AND SPICE PLATE SHALL BE FABRICATED FROM ASTM A 36 STRUCTURAL STEEL.

NOTES:

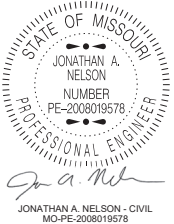
FOR GENERAL NOTES, SEE SHEET 1.

FOR ROADWAYS WHERE TRAFFIC MAY STRIKE THE BACKSIDE OF THE POST, PERFORATED FUSE PLATES SHALL BE INSTALLED ON BOTH SIDES OF THE POST.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**POST INSTALLATION DETAILS**

**HINGE DETAILS**

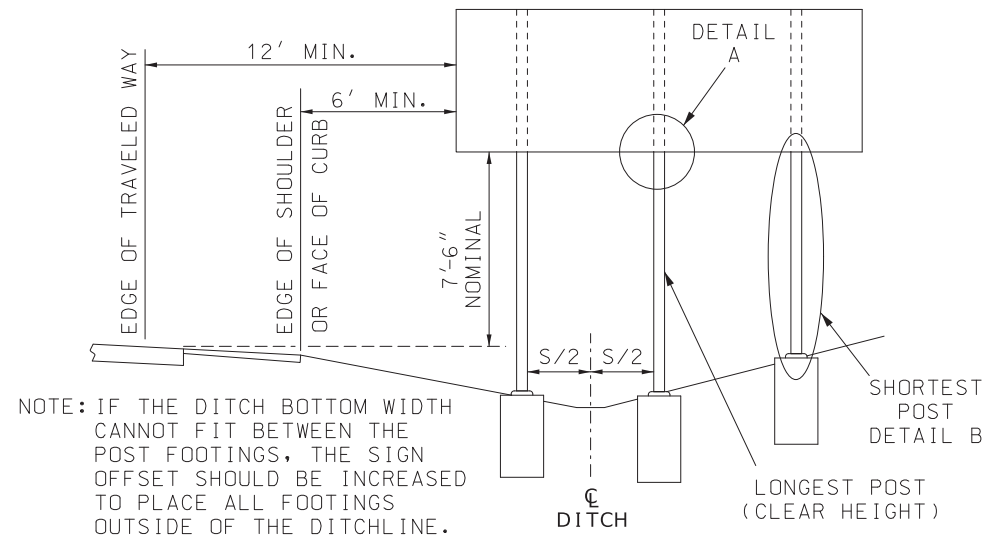
**WIDE FLANGE (WF) POSTS**

DATE EFFECTIVE: 10/1/2025

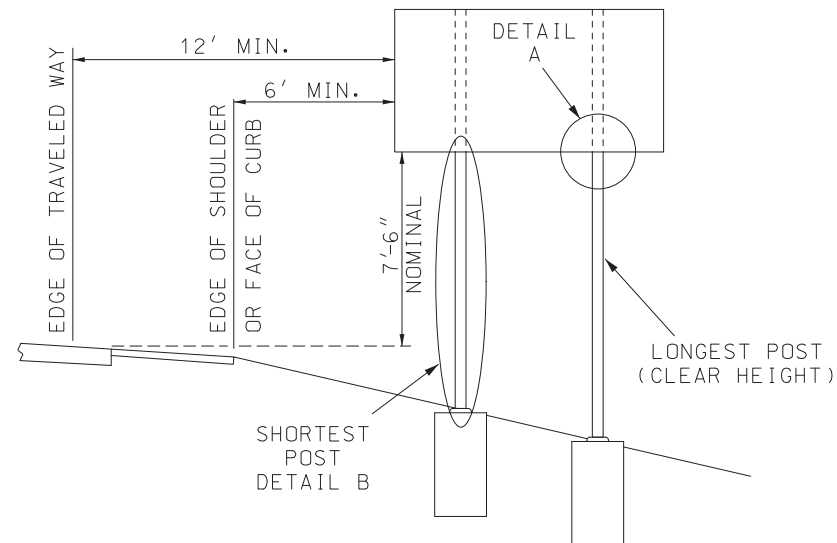
DATE PREPARED: 7/7/2025

903.03BU

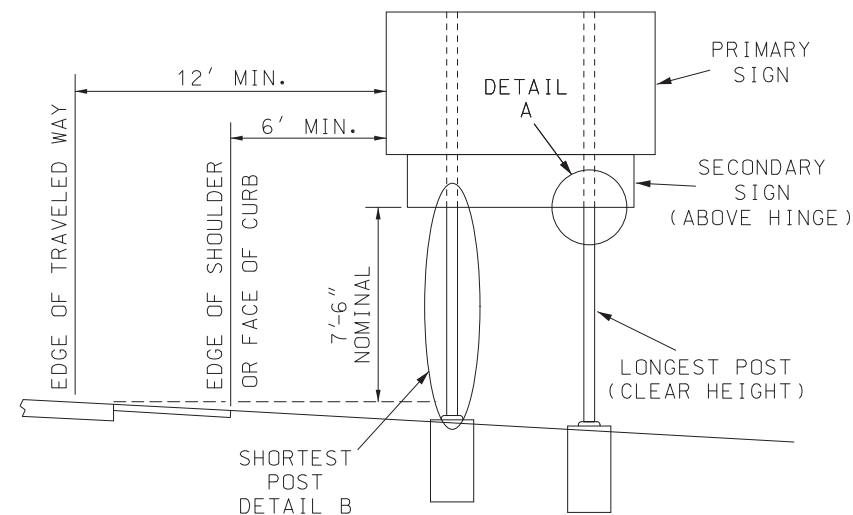
SHEET NO. 2 OF 12



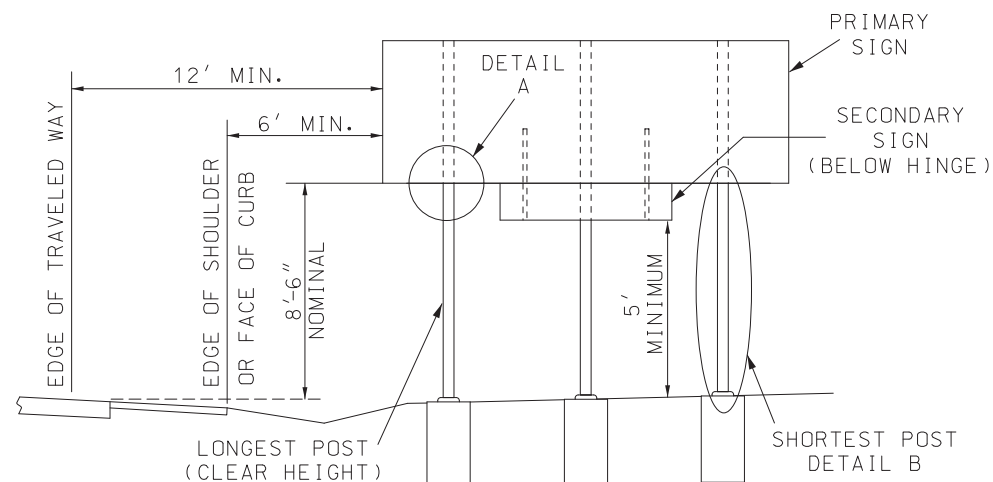
DITCH SECTION



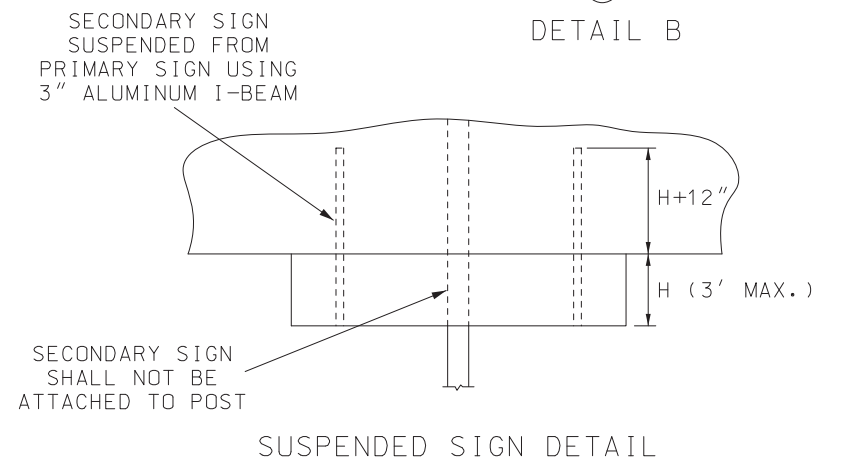
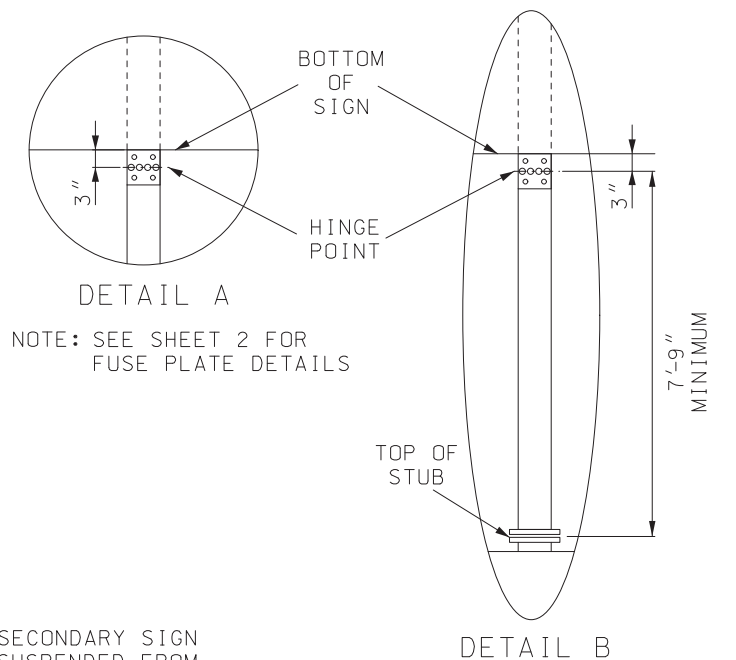
FILL SECTION



SECONDARY SIGN INSTALLATION  
ATTACHED TO SIGN POSTS



SECONDARY SIGN INSTALLATION  
SUSPENDED FROM PRIMARY SIGN

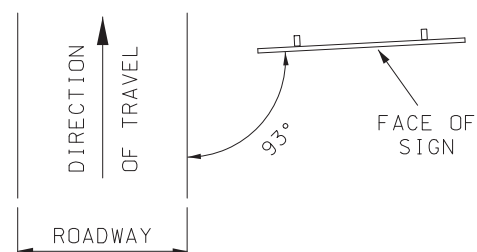


GENERAL NOTES:

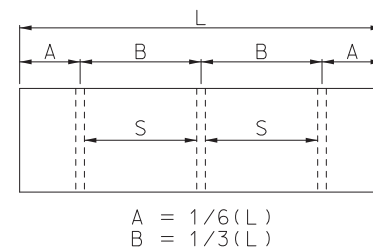
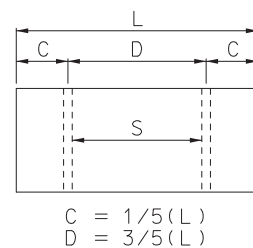
FOR ADDITIONAL INFORMATION ON THE INSTALLATION OF WIDE FLANGE POSTS, SEE SHEET 1 AND 2.

THE MOUNTING HEIGHT OF THE SIGN, MEASURED FROM THE ROAD SURFACE, SHALL ONLY BE INCREASED TO ENSURE THE SHORTEST POST IS A MINIMUM 7'9".

THE CORRECT NUMBER AND SIZE OF POSTS REQUIRED IS CALCULATED BASED ON THE SIGN HEIGHT, WIDTH AND THE CLEAR HEIGHT. THE CLEAR HEIGHT IS THE LENGTH OF THE LONGEST POST MEASURED FROM THE TOP OF THE STUB TO THE HINGE POINT AND DIRECTLY EFFECTS THE NUMBER AND SIZE OF POSTS REQUIRED TO SUPPORT A SIGN.



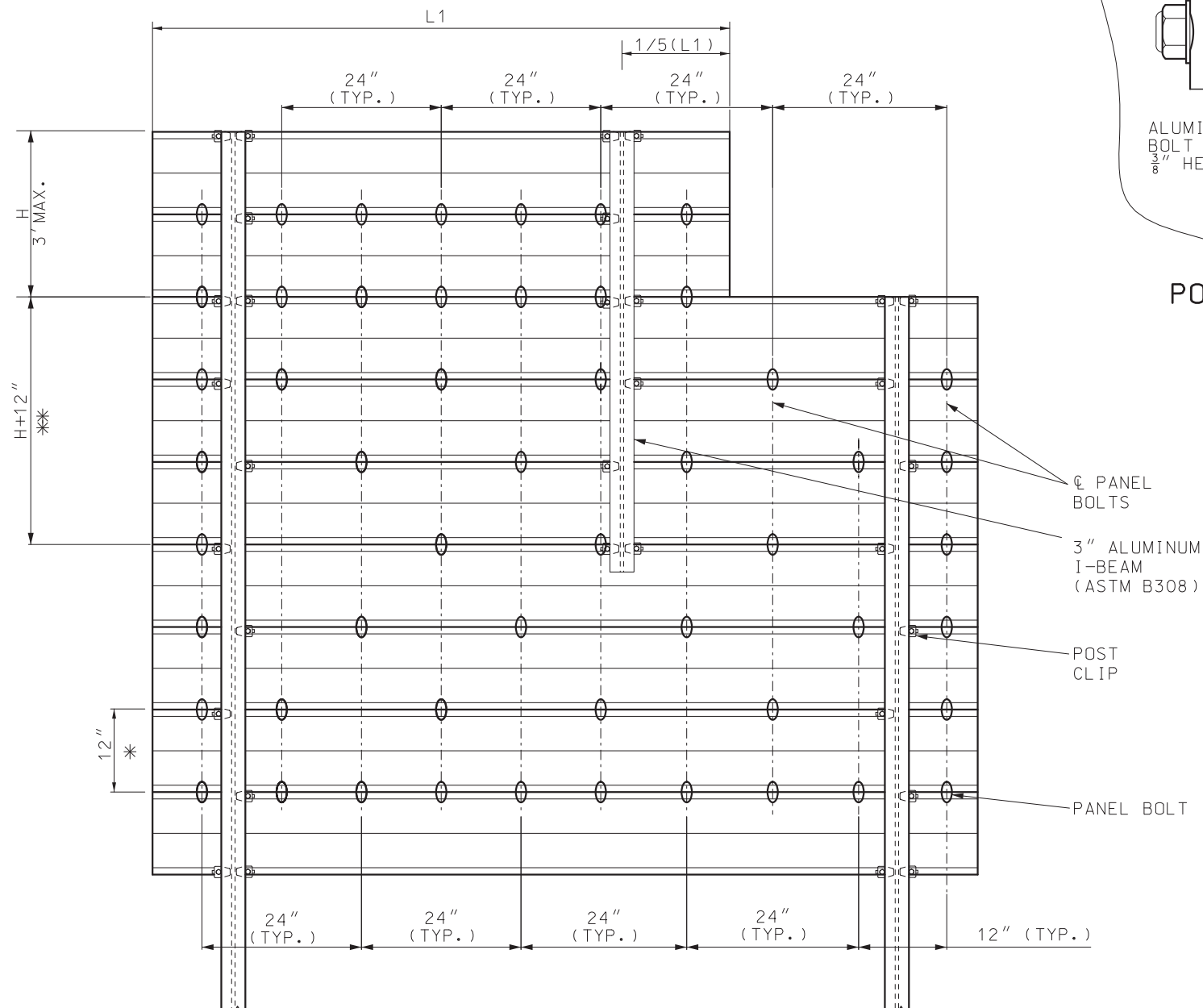
SIGN ORIENTATION



POST DESIGNS 3, 4, 5 AND 6 (18 LBS/FT OR HEAVIER) "S" SHALL BE A MINIMUM OF 7'  
POST DESIGNS 1 AND 2 "S" MAY BE LESS THAN 7'  
FOR "L" OF 6' TO 17' TYPICALLY USE TWO POSTS  
FOR "L" GREATER THAN 17' TYPICALLY USE THREE POSTS  
DO NOT USE THREE POSTS FOR "L" LESS THAN 11'

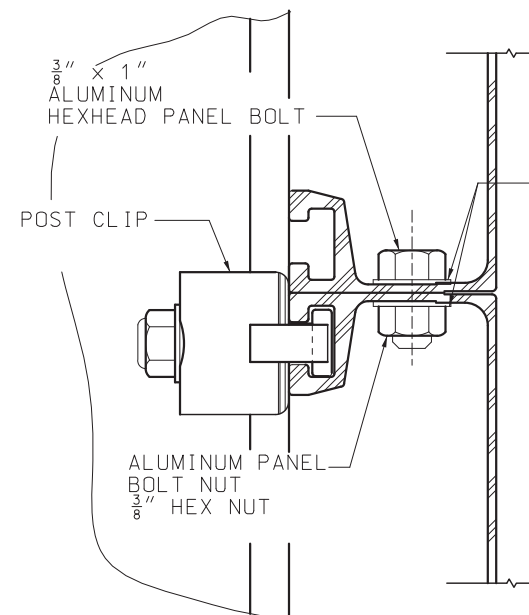
POST SPACING

|                                                                                                                                                                                                                                  |                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                                     |
|                                                                                                                                             | <b>POST INSTALLATION DETAILS</b><br><b>TYPICAL SECTION, MOUNTING HEIGHT AND POST SPACING WIDE FLANGE (WF) POSTS</b> |
| DATE EFFECTIVE: 10/1/2025<br>DATE PREPARED: 7/7/2025                                                                                                                                                                             | <b>903.03BU</b><br>SHEET NO. 3 OF 12                                                                                |

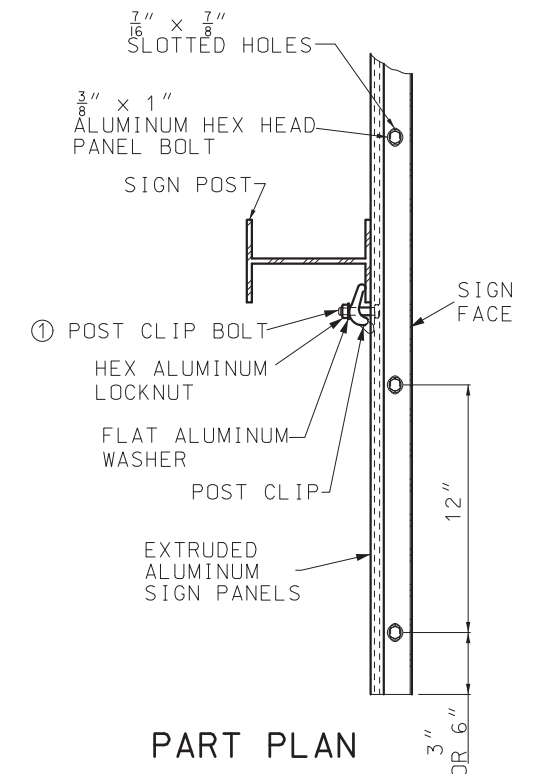


PANEL BOLT LOCATION

\* EXTRUDED ALUMINUM PANEL.  
 \*\* APPLIES TO SIGNS SUSPENDED ABOVE OR BELOW THE PRIMARY SIGN IF SECONDARY SIGN IS NOT ATTACHED TO THE MAIN SIGN POSTS.



POST CLIP DETAIL



PART PLAN

① SIGNS SHALL BE FIELD ATTACHED TO POSTS WITH POST CLIPS AND BOLTS, SEE POST CLIP DETAIL. THE SHANK OF THE POST CLIP BOLT SHALL FIT TIGHTLY AGAINST THE POST FLANGE AFTER THE LOCKNUTS ARE TORQUED. LOCKNUTS ON THE POST CLIP BOLTS SHALL BE TORQUED TO 225 INCH-POUNDS WHEN USING DRY, CLEAN, UNLUBRICATED THREADS.

NOTES:

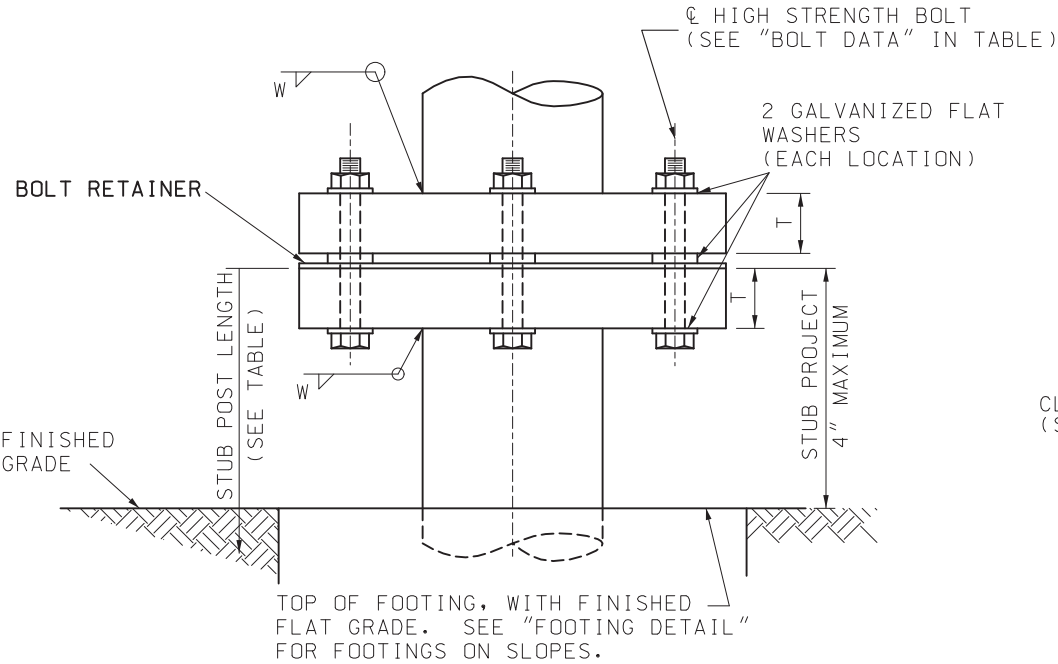
FOR GENERAL NOTES, SEE SHEET 1.

FOR EXTRUDED ALUMINUM PANEL AND POST CLIP DETAILS, SEE STANDARD PLAN 903.02.

|                                                                                                                                                         |                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                          |
| <p>JONATHAN A. NELSON - CIVIL<br/>MO-PE-2008019578</p>                                                                                                  | <p><b>SIGN MOUNTING DETAILS</b></p> <p><b>WIDE FLANGE (WF) POSTS</b></p> |
| <p>DATE EFFECTIVE: 10/1/2025</p> <p>DATE PREPARED: 7/7/2025</p>                                                                                         | <p>903.03BU</p>                                                          |
| <p>SHEET NO. 4 OF 12</p>                                                                                                                                |                                                                          |

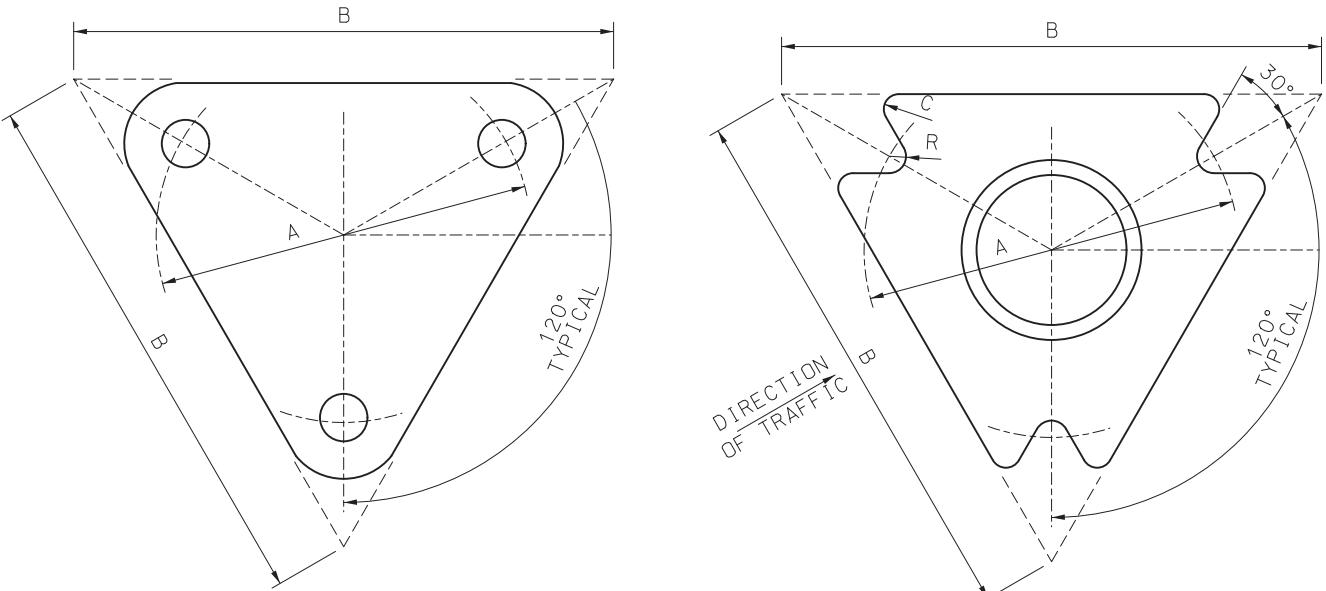
| ROUND PIPE POST FOR GROUND MOUNTED SIGNS |            |               |                   |           |           |              |                                  |    |     |      |   |      |
|------------------------------------------|------------|---------------|-------------------|-----------|-----------|--------------|----------------------------------|----|-----|------|---|------|
| POST                                     | BOLT       |               |                   | WASHER    |           |              | BASE CONNECTION DATA TABLE (IN.) |    |     |      |   |      |
| NOM SIZE<br>(IN.-ID)                     | DIA<br>IN. | LENGTH<br>IN. | TORQUE<br>IN./LB. | OD<br>IN. | ID<br>IN. | THICK<br>IN. | A                                | B  | C   | R    | T | W    |
| 2 1/2                                    | 1/2        | 3 1/2         | 140               | 1 1/16    | 1 7/32    | 1/8          | 6 1/4                            | 9  | 1/4 | 9/32 | 1 | 1/4  |
| 4                                        | 5/8        | 3 3/4         | 345               | 1 5/16    | 1 11/16   | 1/8          | 7 3/16                           | 10 | 1/4 | 3/8  | 1 | 5/16 |

| ROUND PIPE POST AND FOOTING DATA TABLE |        |        |                |         |       |                  |
|----------------------------------------|--------|--------|----------------|---------|-------|------------------|
| NOM.<br>SIZE<br>(IN.)                  | WEIGHT |        | STUB<br>LENGTH | FOOTING |       | CONCRETE<br>C.Y. |
|                                        | LBS/FT | LBS/IN |                | DIA.    | DEPTH |                  |
| 2 1/2                                  | 5.79   | 0.48   | 4' - 3 1/2"    | 12"     | 4'-6" | 0.13             |
| 4                                      | 10.79  | 0.90   | 5' - 3 1/2"    | 18"     | 5'-6" | 0.36             |



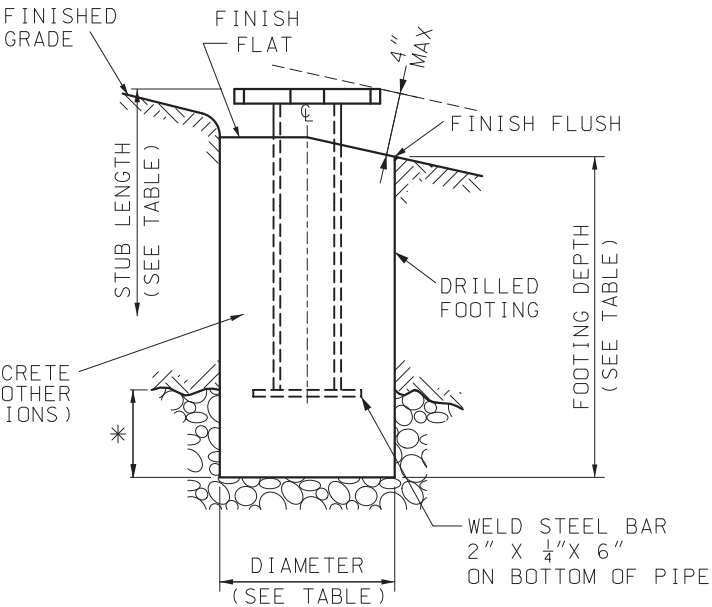
ELEVATION  
(STEEL PIPE POST BASE CONNECTION)

MULTI-DIRECTION SLIP BASE



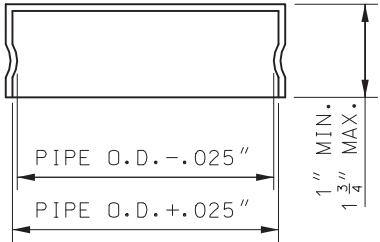
BOLT RETAINER

SHEET METAL BOLT RETAINER CUT FROM 30 GAUGE GALVANIZED SHEET METAL. PLACE BETWEEN BASE PLATES. SIZE VARIES TO FIT PLATE. BOLT HOLES SHALL BE 1/16" LARGER THAN REQUIRED BOLT SIZE.



FOOTING DETAIL

ROLLED CRIMP TO ENGAGE PIPE O.D.



FRICTION CAP

NOTE:  
FOR GENERAL NOTES, SEE SHEET 1.  
FOR MOUNTING HEIGHT AND OFFSET DETAILS, SEE SHEET 11.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

POST INSTALLATION DETAILS

PIPE POST

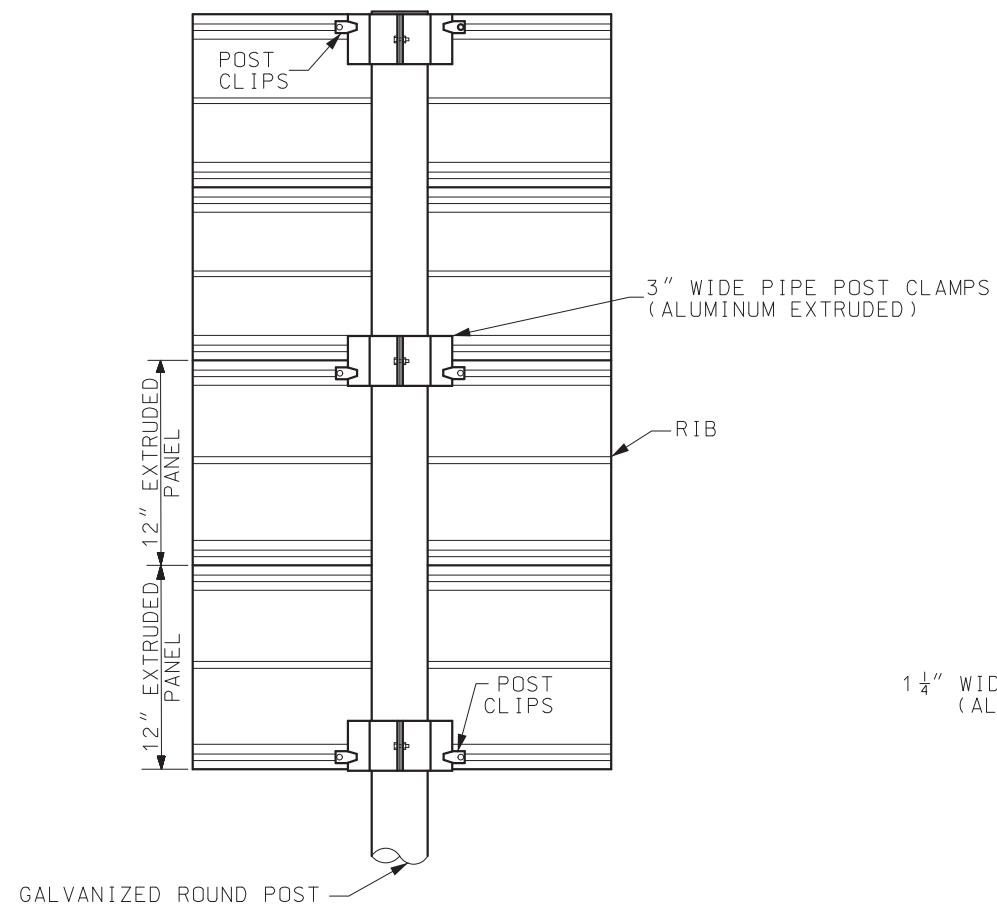
DATE EFFECTIVE: 10/1/2025

DATE PREPARED: 7/7/2025

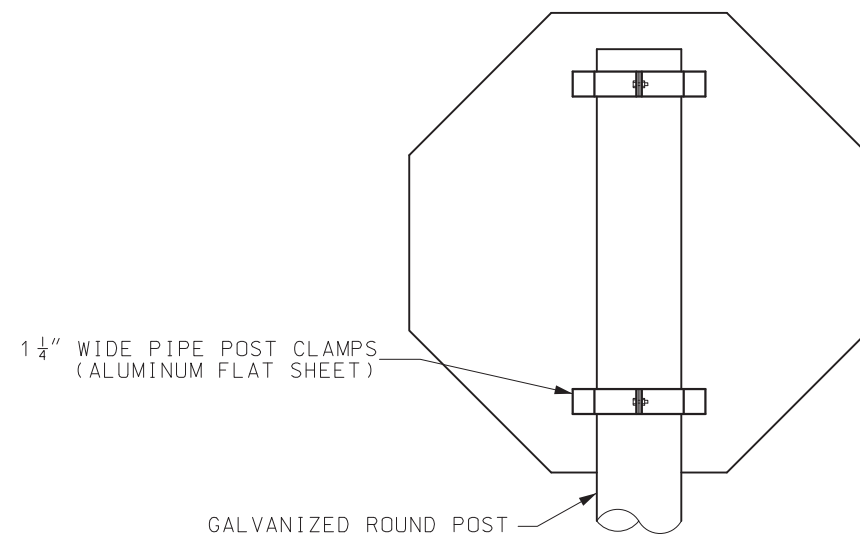
903.03BU

SHEET NO.

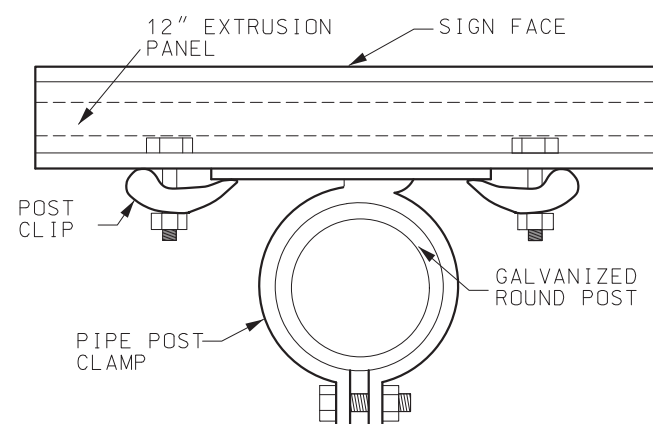
5 OF 12



PROFILE VIEW

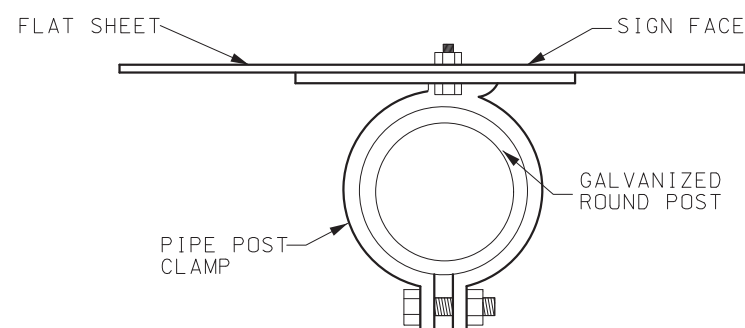


PROFILE VIEW



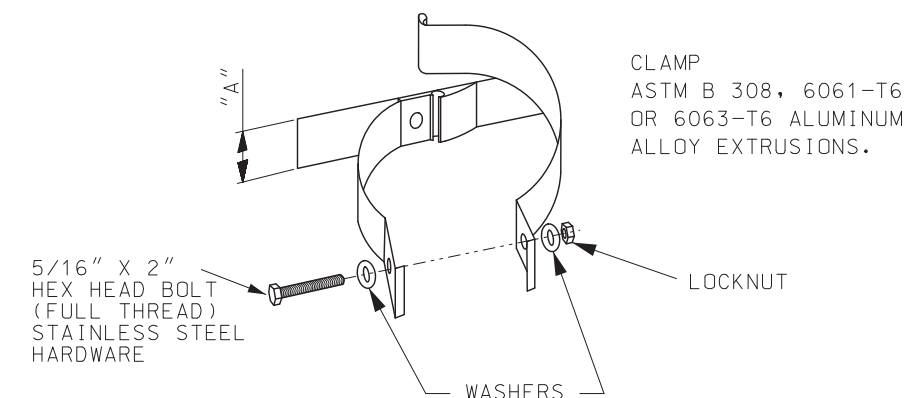
PLAN VIEW

MOUNTING DETAILS FOR EXTRUDED PANELS  
ON PIPE POST



PLAN VIEW

MOUNTING DETAILS FOR FLAT SHEET  
ON PIPE POST



CLAMP TYPE SIGN SUPPORT  
FOR PIPE POST

| WIDTH OF PIPE POST CLAMP |             |
|--------------------------|-------------|
| SIGN TYPE                | MINIMUM "A" |
| FLAT                     | 1 1/4"      |
| STRUCTURAL               | 3"          |

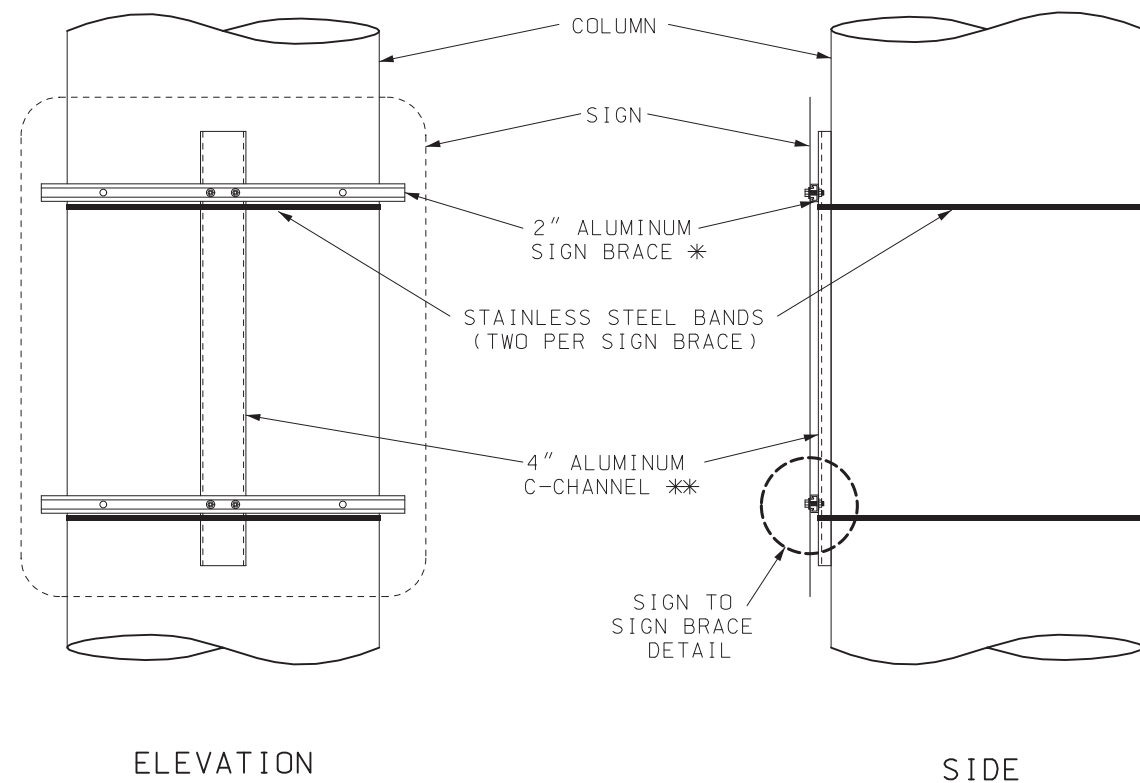
NOTES:

FOR GENERAL NOTES, SEE SHEET 1.

FOR MOUNTING HEIGHT AND OFFSET DETAILS,  
SEE SHEET 11.

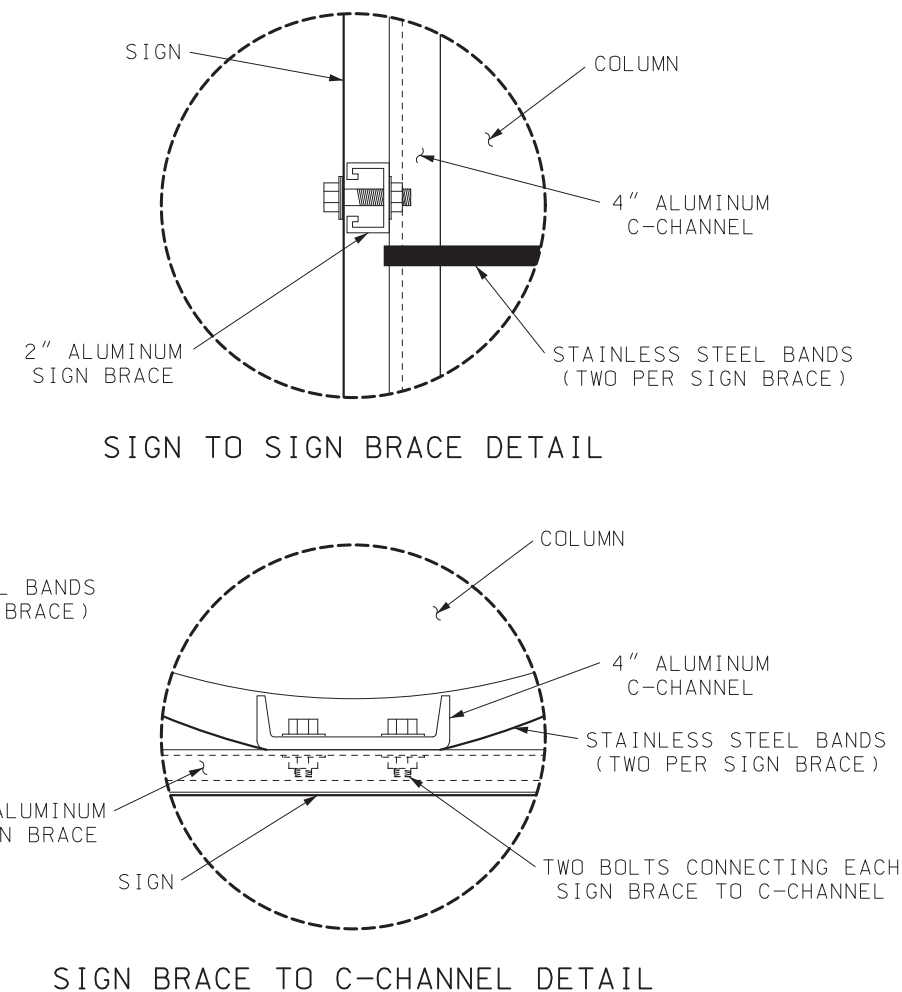
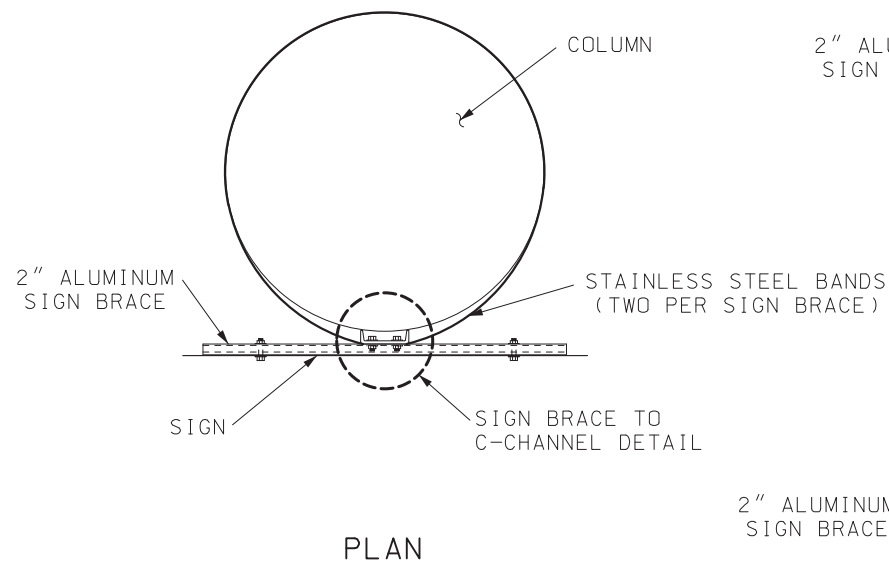
FOR DETAILS OF EXTRUDED ALUMINUM PANEL AND  
POST CLIP DETAILS, SEE STANDARD PLAN 903.02.

|                                                                                                                                                                                                                                               |                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|  <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                             |
|  <p>JONATHAN A. NELSON - CIVIL<br/>MO-PE-2008019578</p>                                                                                                  | <p><b>SIGN MOUNTING DETAILS</b></p> <p><b>PIPE POST</b></p> |
| <p>DATE EFFECTIVE: 10/1/2025</p> <p>DATE PREPARED: 7/7/2025</p>                                                                                                                                                                               | <p>903.03BU</p> <p>SHEET NO.<br/>6 OF 12</p>                |

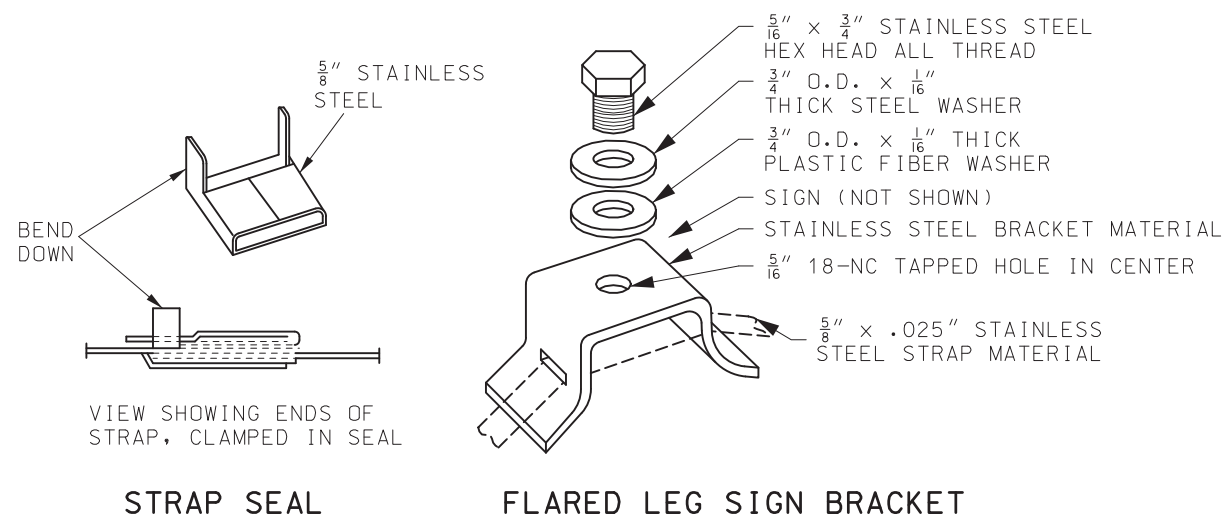


\* MAY BE PERFORATED.  
NUMBER OF SIGN BRACES DETERMINED BY  
HOLE PUNCHING ON STD PLAN 903.02.

\*\* STRUCTURAL 6061T6, MIN. 2.50 LBS/FT



SPECIAL MOUNTING FOR FLAT SHEET  $\geq 36"$  WIDE  
ON ROUND STRUCTURES LOCATED ON FREEWAYS



MOUNTING DETAILS FOR FLAT SHEET  
ON ROUND STRUCTURES

NOTES:

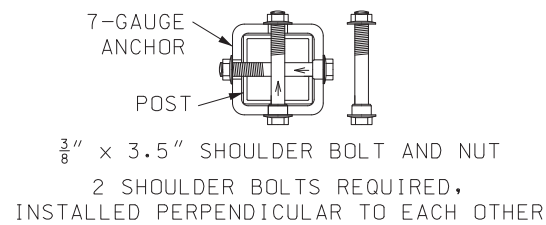
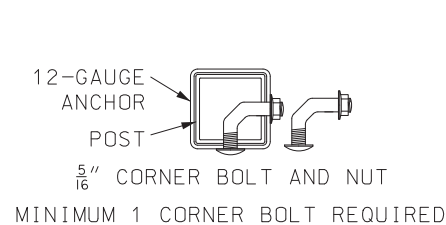
FOR GENERAL NOTES, SEE SHEET 1.

FOR MOUNTING HEIGHT AND OFFSET DETAILS,  
SEE SHEET 11.

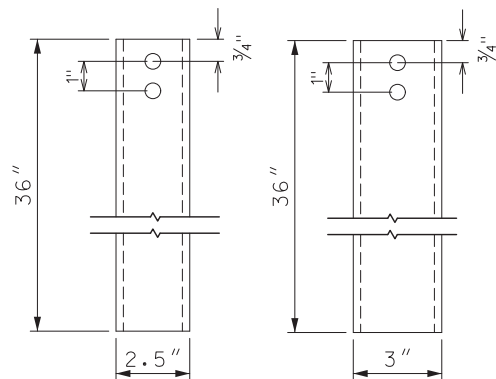
SPECIAL MOUNTING BASED ON SIGN WIDTH  
IN CONJUNCTION WITH ROADWAY TYPE.

|                                                                                                                                                  |                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <p>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                 |
| <p>JONATHAN A. NELSON - CIVIL<br/>MO-PE-2008019578</p>                                                                                           | <p><b>SIGN MOUNTING DETAILS</b><br/><b>ROUND STRUCTURES</b></p> |
| <p>DATE EFFECTIVE: 10/1/2025</p> <p>DATE PREPARED: 7/7/2025</p>                                                                                  | <p>903.03BU</p> <p>SHEET NO.<br/>7 OF 12</p>                    |





12-GAUGE ANCHOR  
7-GAUGE ANCHOR  
ANCHOR BOLT DETAIL



FOR 2" POST      FOR 2.5" POST

BOLT HOLE DIAMETER -  $1\frac{7}{32}$ "  
2 PER SIDE ON ALL 4 SIDES

7-GAUGE ANCHOR  
FABRICATION DETAIL

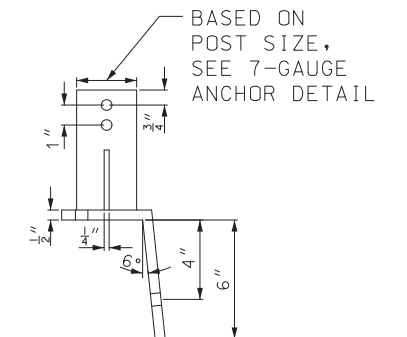
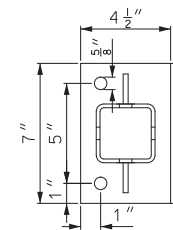
ANCHOR TUBE SHALL BE 7-GAUGE

$1\frac{1}{2}$ " X  $4\frac{1}{2}$ " GALVANIZED MECHANICAL FASTENERS SHALL BE USED TO ATTACH ANCHOR TO BARRIER WALL

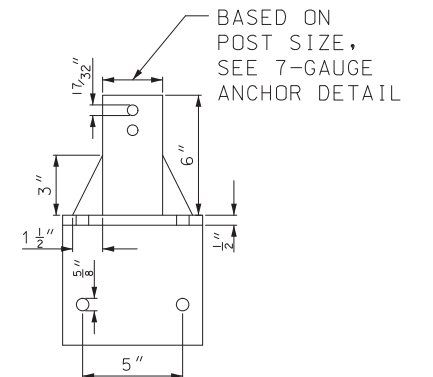
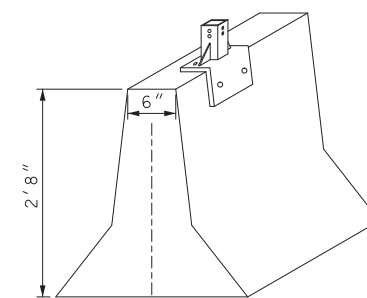
SHOULDER BOLTS SHALL BE USED TO ATTACH PSST POST TO ANCHOR (SEE ANCHOR BOLT DETAIL)

ANCHOR SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION PER SECTION 1080

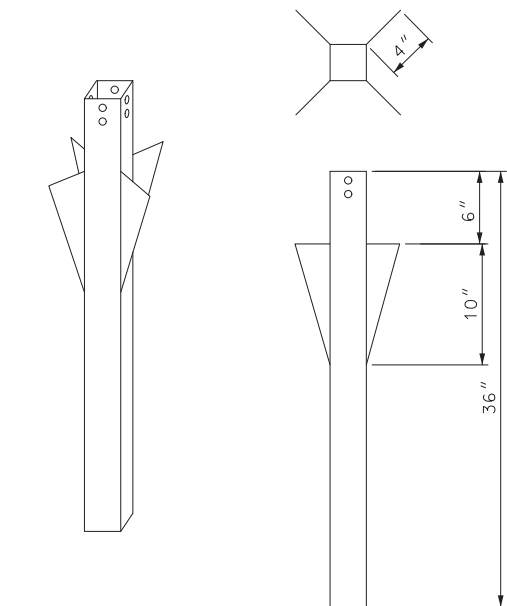
FURNISHING AND INSTALLATION OF BARRIER WALL POST ANCHOR FOR PSST SHALL BE PAID PER EACH AS CONCRETE POST ANCHOR



BASED ON POST SIZE, SEE 7-GAUGE ANCHOR DETAIL

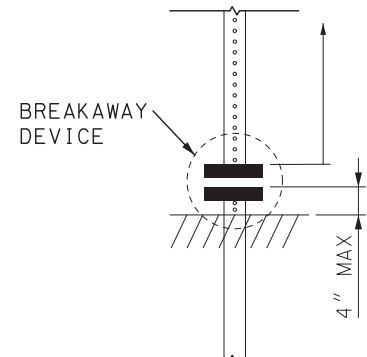


BASED ON POST SIZE, SEE 7-GAUGE ANCHOR DETAIL



12-GAUGE (NOT SHOWN) OR 7-GAUGE

OMNIDIRECTIONAL/STABILIZED  
DRIVEN ANCHOR DETAIL

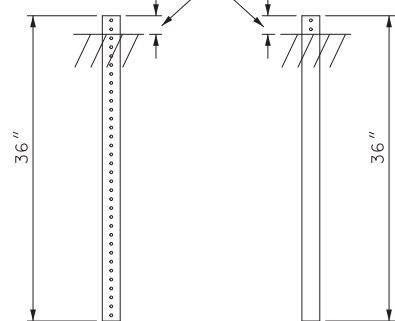


2.5" + 2.25" POST COMPRISED OF 2.5" PSST WITH 6-FT INSERT OF 2.25" PSST THAT RUNS UP FROM THE BREAKAWAY DEVICE

THE BREAKAWAY DEVICE PORTION FIXED TO THE GROUND ANCHOR SHALL BE NO HIGHER THAN 4" ABOVE THE FINISHED GRADE

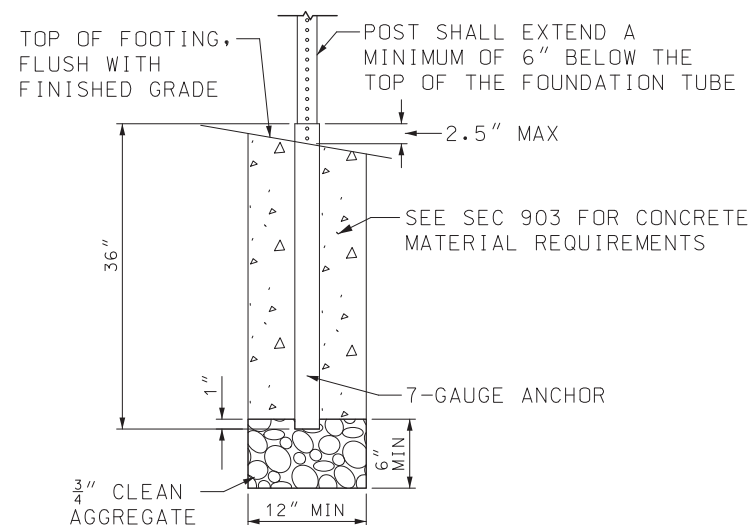
BREAKAWAY AND 2.5" + 2.25" POST DETAIL

THE ANCHOR SHOULD BE A MAXIMUM OF 2.5" ABOVE THE GROUND LEVEL

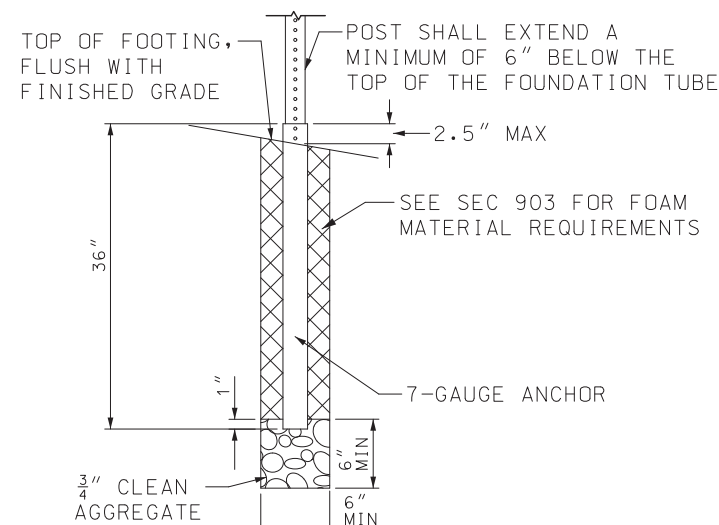


12-GAUGE      7-GAUGE

DRIVEN ANCHOR  
INSTALLATION DETAIL



CONCRETE FOOTING DETAIL



POLYURETHANE FOAM FOOTING DETAIL

NOTES:

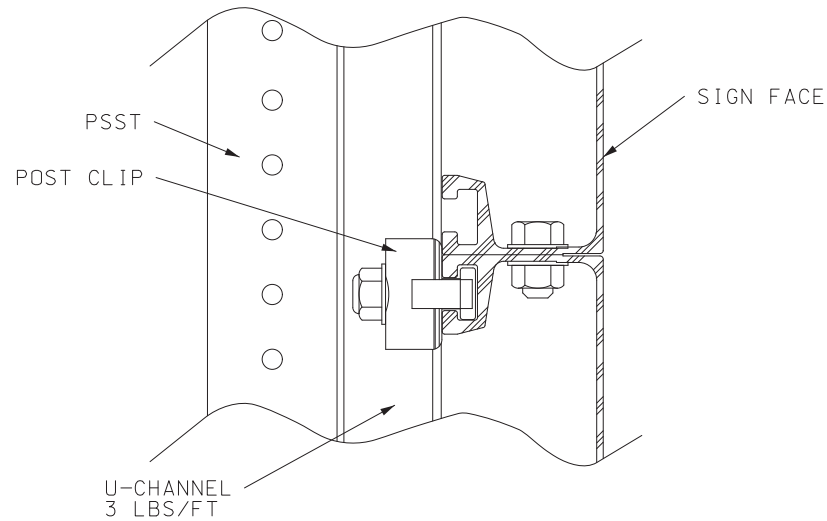
FOR GENERAL NOTES, SEE SHEET 1.

FOR MOUNTING HEIGHT AND OFFSET DETAILS, SEE SHEET 11.

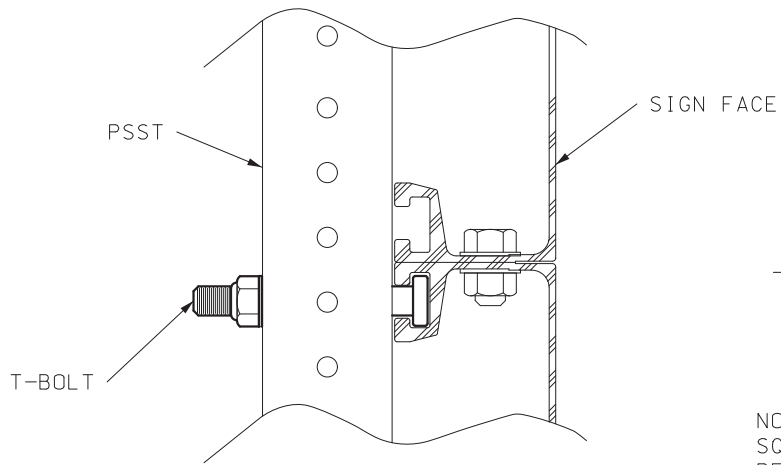
ALL BREAKAWAY DEVICES USED ON AN INSTALLATION SHALL BE CERTIFIED NCHRP 350 COMPLIANT.

|                                                                                                                                                                                                                                  |                                                                                |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                |          |
| <br>JONATHAN A. NELSON - CIVIL<br>MO-PE-2008019578                                                                                          | <b>POST INSTALLATION DETAILS</b><br><b>PERFORATED SQUARE STEEL TUBE (PSST)</b> |          |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 10/1/2025<br>DATE PREPARED: 7/7/2025                           | 903.03BU |

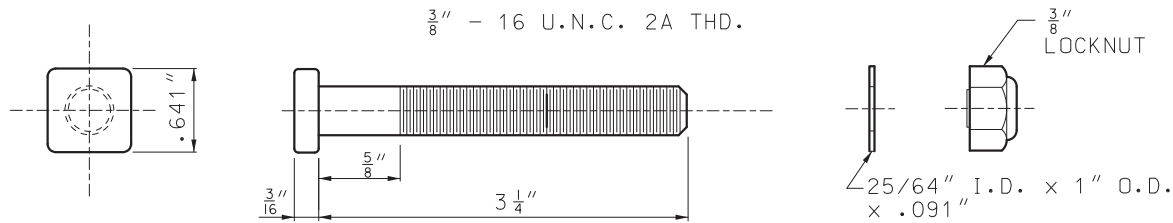




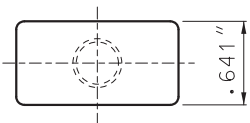
PROFILE



PROFILE



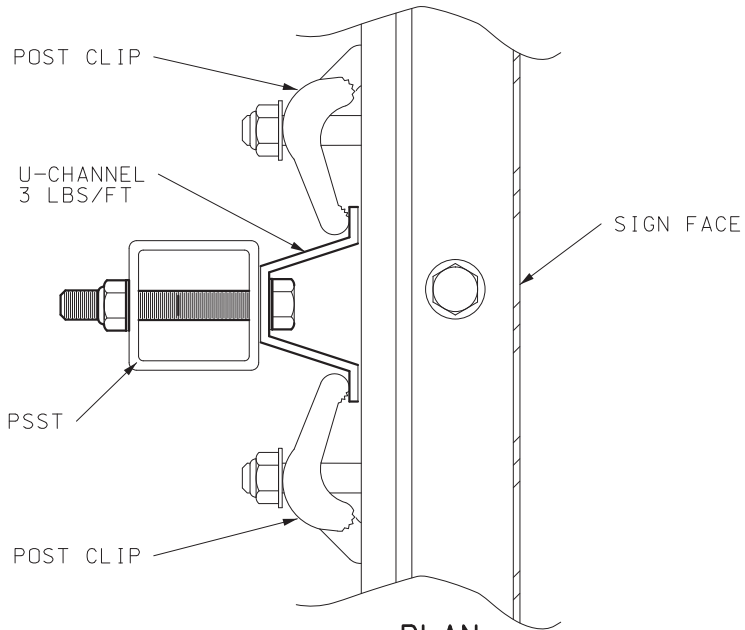
NOTE:  
SQUARE BOLT HEAD SHOWN MAY BE REPLACED WITH  
RECTANGULAR BOLT HEAD WITH THE NARROW DIMENSION  
EQUAL TO .641".



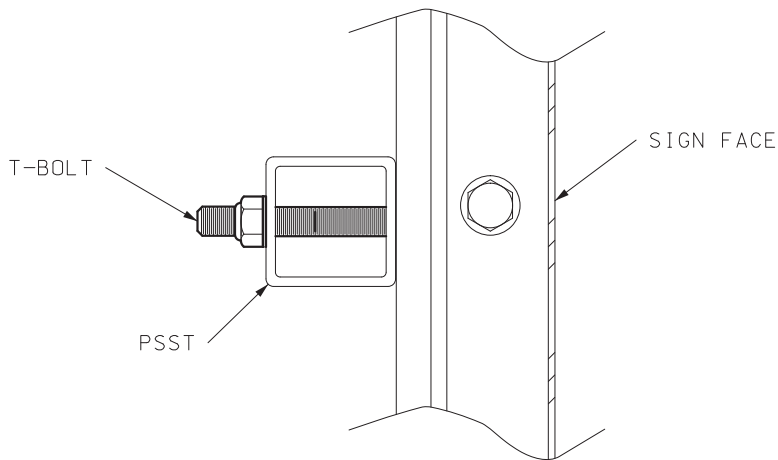
T-BOLT DETAIL

BOLT - 1 3/4 x ALUMINUM  
BOLT - 3 1/4 x ALUMINUM  
HEX LOCKNUT - 3/8" ALUMINUM  
WASHER - ALUMINUM

- NOTES:
- ALUMINUM BOLTS SHALL BE ASTM B 211, 2024-T4 OR 6061-T6
  - ALUMINUM FLAT WASHERS SHALL BE ASTM B 209, ALCLAD 2024-T4 OR 2024-T4
  - ALUMINUM LOCK NUTS (NYLON INSERT) SHALL BE ASTM B 211 OR 2017-T4



POST CLIP METHOD



T-BOLT METHOD

# EXTRUDED PANEL MOUNTING DETAIL

| NUMBER OF BOLTS TO<br>ATTACH STEEL CHANNEL<br>TO PSST POST |                                    |
|------------------------------------------------------------|------------------------------------|
| SIGN HEIGHT                                                | NO. OF BOLTS PER<br>PSST POST USED |
| 1'                                                         | 2                                  |
| 2'                                                         | 3                                  |
| 3'                                                         | 4                                  |
| 4'                                                         | 5                                  |
| 5'                                                         | 6                                  |
| 6'                                                         | 7                                  |
| 7'                                                         | 8                                  |

- NOTES:
- FOR THE GENERAL NOTES, SEE SHEET 1.
- FOR MOUNTING HEIGHT AND OFFSET DETAILS,  
SEE SHEET 11.
- FOR POST CLIP DETAILS, SEE STANDARD PLAN 903.02.
- ALTERNATE PSST MOUNTING HARDWARE USE SHALL BE  
ON APPROVED LIST.

**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**SIGN MOUNTING DETAILS**

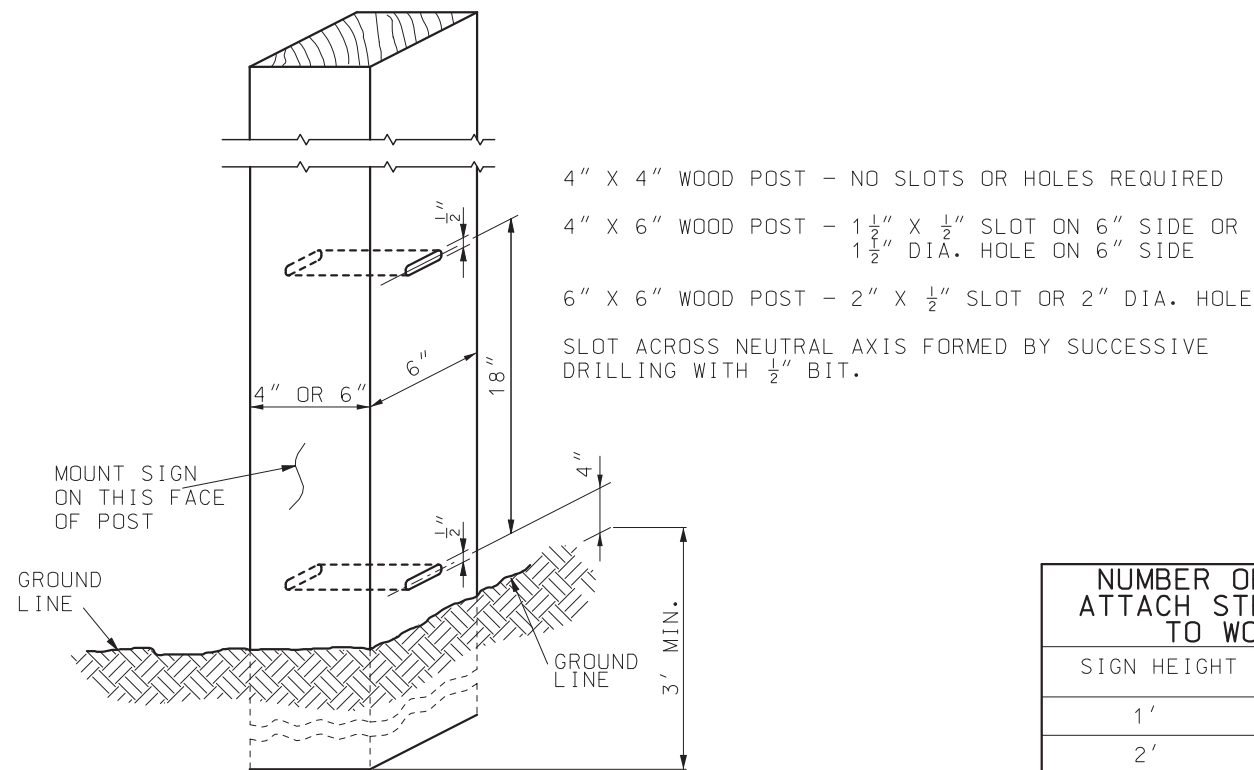
**PERFORATED SQUARE STEEL TUBE (PSST)**

DATE EFFECTIVE: 10/1/2025

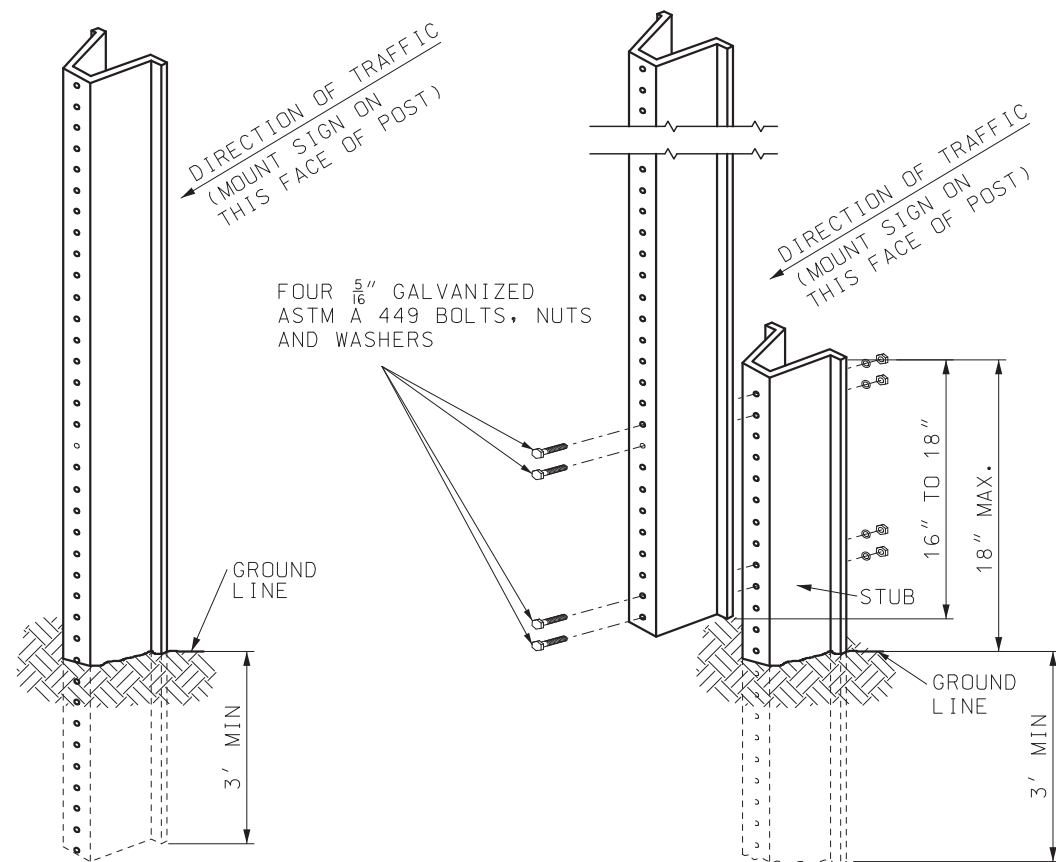
DATE PREPARED: 7/7/2025

903.03BU

SHEET NO.  
9 OF 12



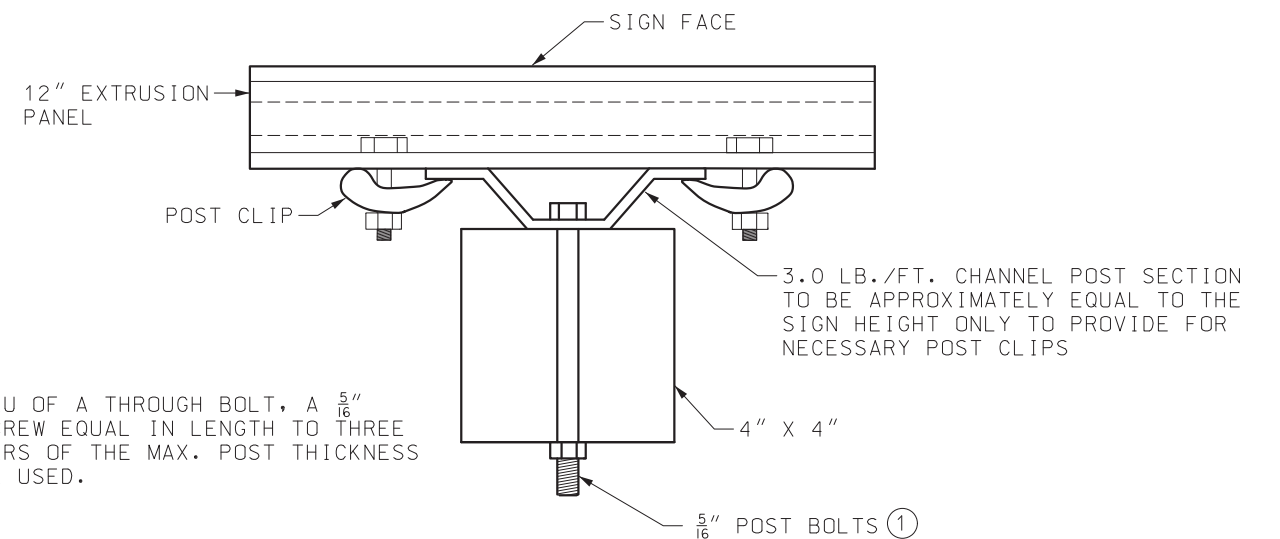
WOOD POST DETAIL



U-CHANNEL POST DETAIL

U-CHANNEL STUB DETAIL  
OPTIONAL INSTALLATION

| NUMBER OF BOLTS TO ATTACH STEEL CHANNEL TO WOOD POST |                                 |
|------------------------------------------------------|---------------------------------|
| SIGN HEIGHT                                          | NO. OF BOLTS PER WOOD POST USED |
| 1'                                                   | 2                               |
| 2'                                                   | 3                               |
| 3'                                                   | 4                               |
| 4'                                                   | 5                               |
| 5'                                                   | 6                               |
| 6'                                                   | 7                               |
| 7'                                                   | 8                               |



PLAN VIEW  
MOUNTING DETAILS FOR EXTRUDED  
PANELS ON WOOD POST

NOTES:

FOR GENERAL NOTES, SEE SHEET 1.

ALL POSTS SHALL BE EMBEDDED A MINIMUM OF 3 FEET INTO THE GROUND.

U-CHANNEL POST-STUB OVERLAP SHALL BE POSITIONED ENTIRELY BETWEEN GROUND LINE AND 18" ABOVE GROUND LINE.

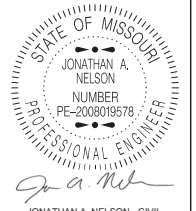
FOR POST CLIP DETAILS, SEE STANDARD PLAN 903.02.

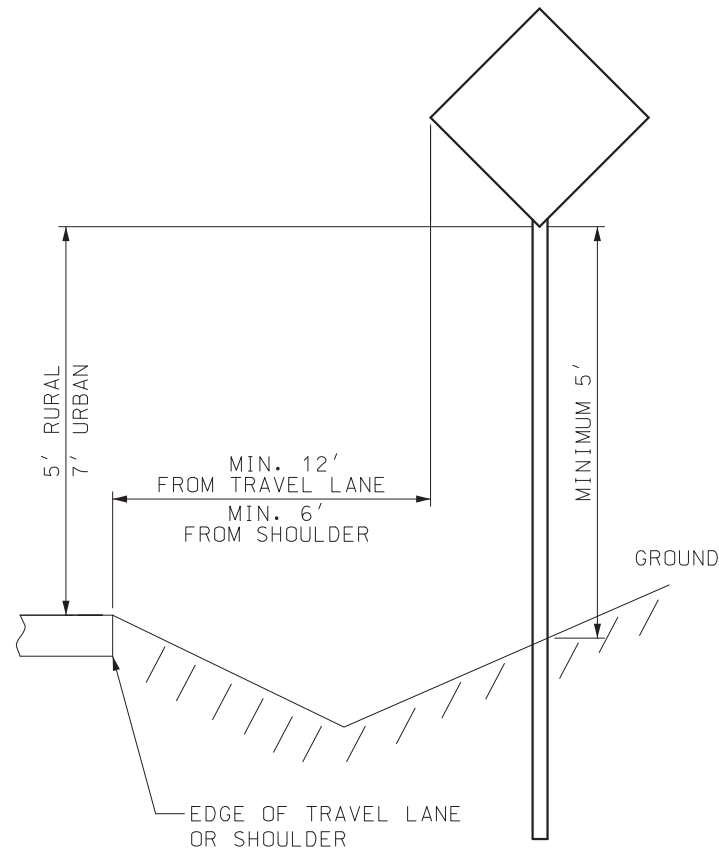
FOR MOUNTING HEIGHT AND OFFSET DETAILS, SEE SHEET 11.

| SIGN AREA (SQ.FT.) | POST TYPE        |                             |
|--------------------|------------------|-----------------------------|
|                    | U-CHANNEL        | WOOD                        |
| ≤ 10               | 1 - 3.0 LB./FT.* | 1 - 4" X 4"*                |
| > 10 ≤ 16          | 2 - 3.0 LB./FT.  | 2 - 4" X 4"<br>1 - 4" X 6"* |
| > 16 ≤ 24          | 2 - 3.0 LB./FT.  | 2 - 4" X 6"                 |
| > 24 ≤ 30          | 3 - 3.0 LB./FT.  | 2 - 4" X 6"                 |
| > 30 ≤ 50          | N/A              | 2 - 6" X 6"                 |

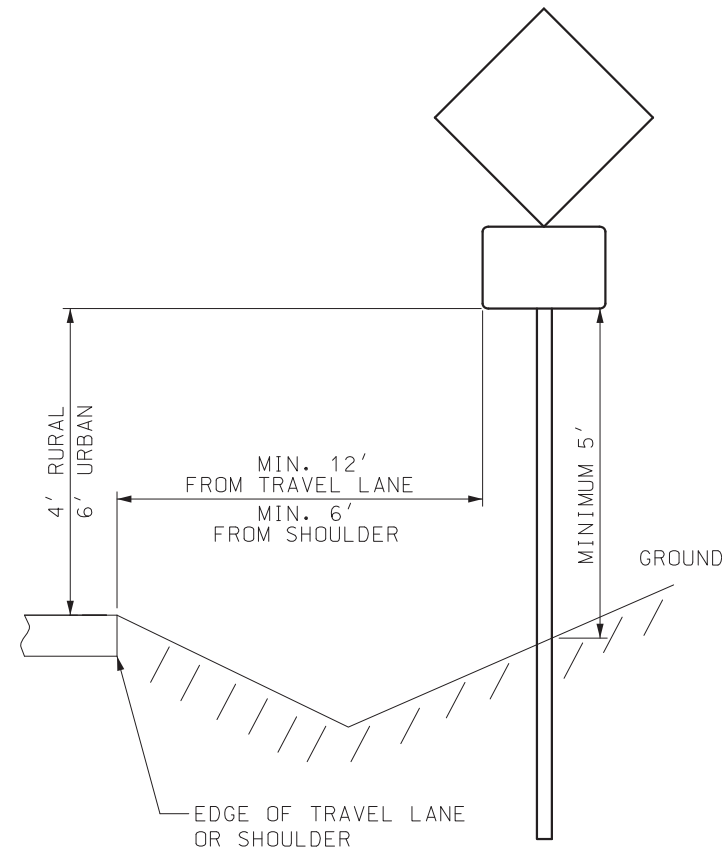
\* SIGNS GREATER THAN 4 FEET IN WIDTH REQUIRE TWO POSTS, EXCEPT DIAMOND SHAPED WARNING SIGNS, YIELD SIGNS, AND ONE WAY SIGNS.

POST SIZE REQUIREMENTS

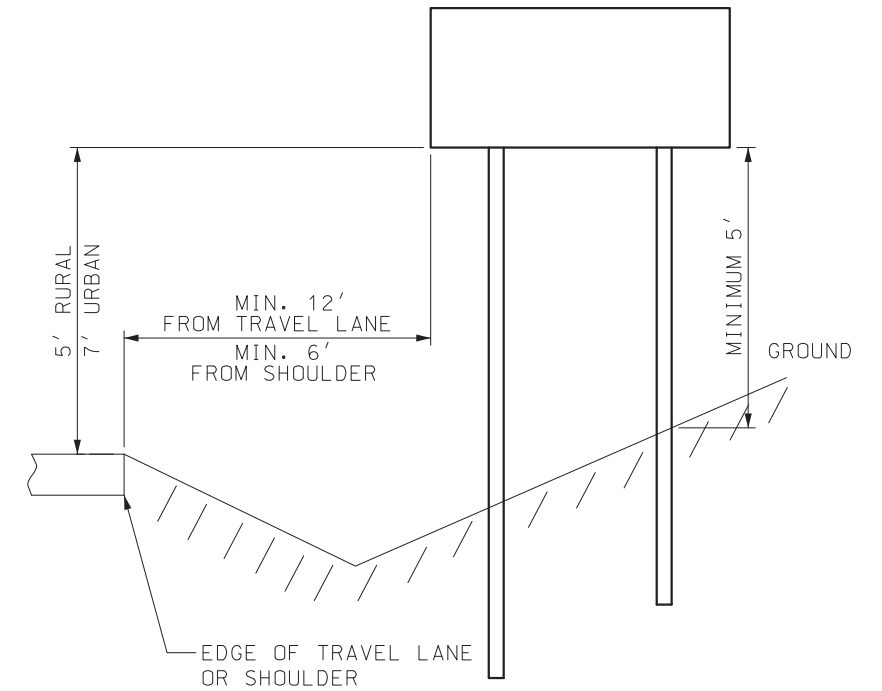
|                                                                                                                                                                                                                                  |                                                                        |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                        |                 |
| <br>JONATHAN A. NELSON - CIVIL<br>MO-PE-2008019578                                                                                          | <b>POST INSTALLATION DETAILS</b><br><br><b>WOOD AND U-CHANNEL POST</b> |                 |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 10/1/2025<br>DATE PREPARED: 7/7/2025                   | <b>903.03BU</b> |



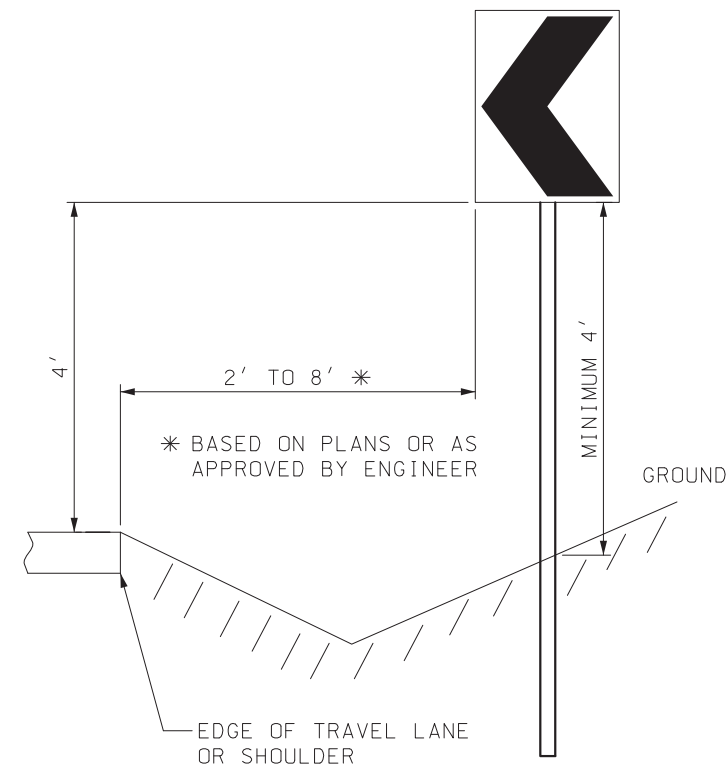
ONE POST – SINGLE SIGN



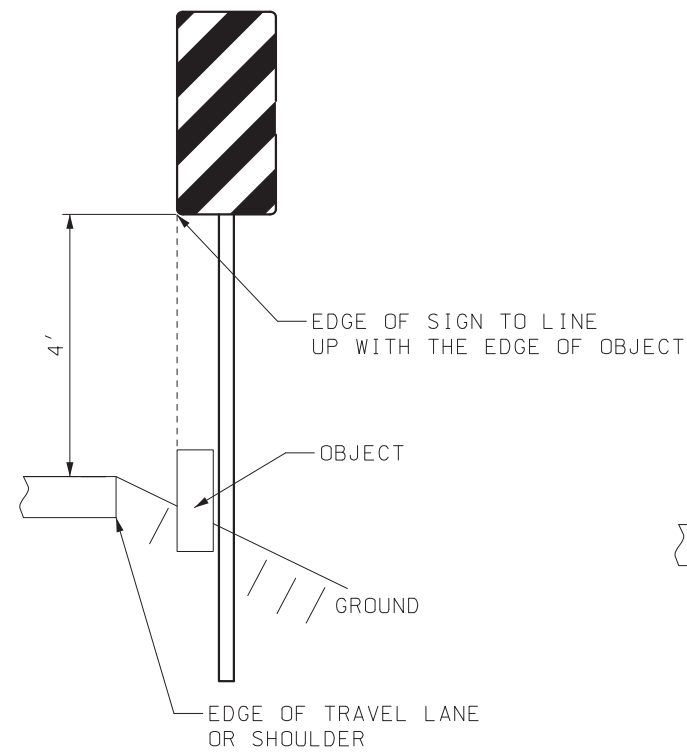
ONE POST – SINGLE SIGN WITH SUPPLEMENTAL PLAQUE



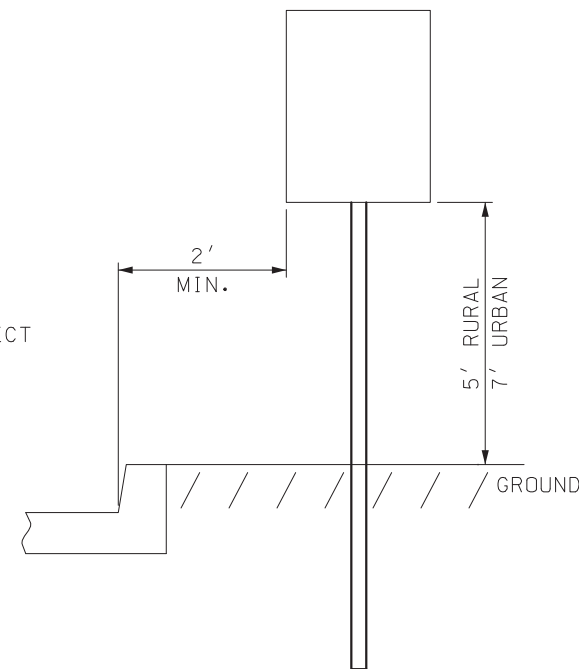
TWO POST



CHEVRON SIGN



TYPE 3 OBJECT MARKER



ADJACENT TO CURB

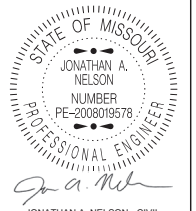
GENERAL NOTES:

SIGN MOUNTING BOLTS SHALL BE INSTALLED WITH A NYLON WASHER AGAINST THE SIGN FACE WITH A STEEL WASHER BETWEEN THE NYLON WASHER AND BOLT HEAD.

A LOCKNUT SHALL BE USED TO FASTEN THE SIGN TO THE POST.

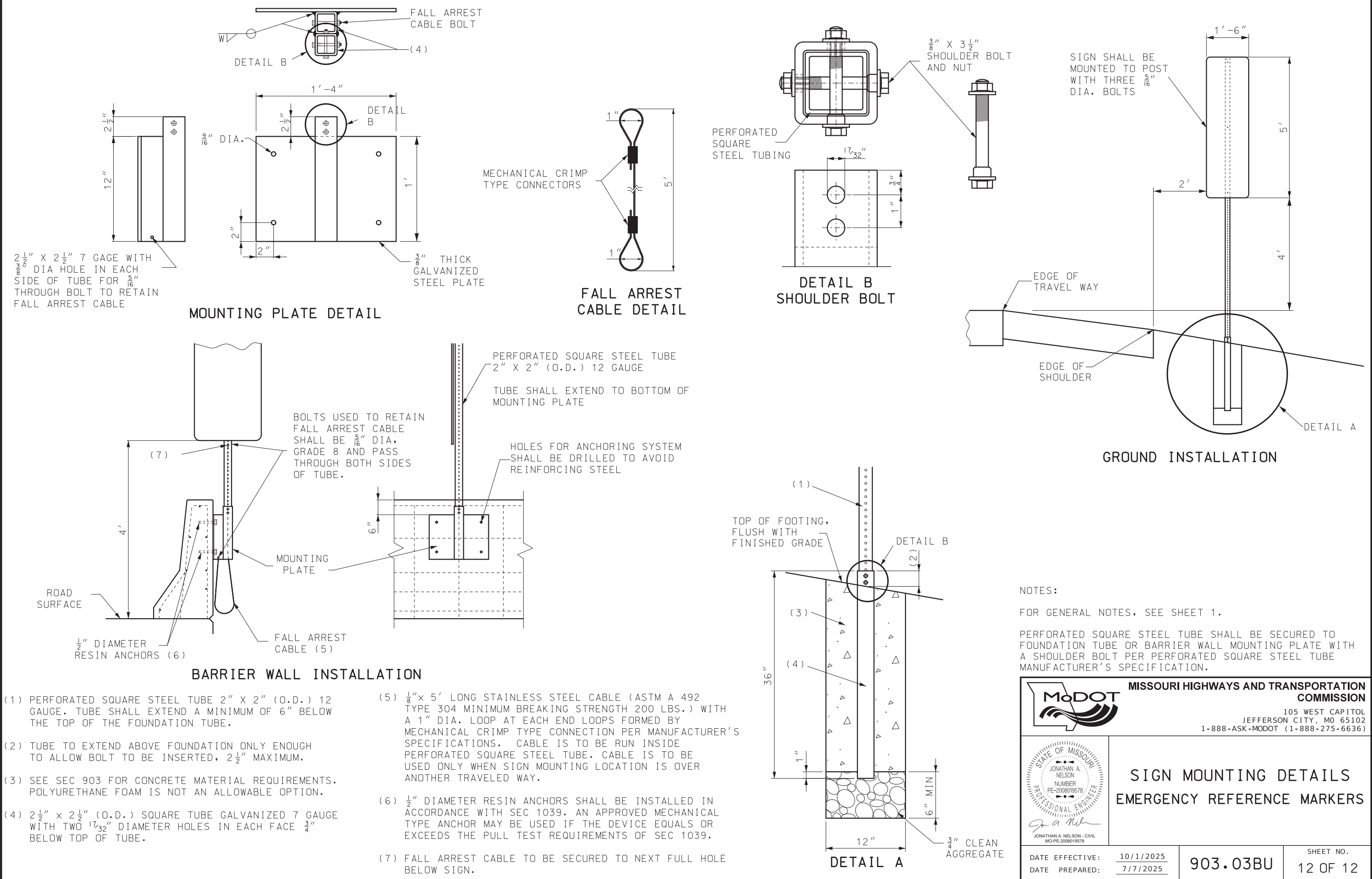
VERTICAL CLEARANCE FROM THE ROADWAY SHALL BE MET AND INCREASED ONLY TO MEET THE MINIMUM VERTICAL CLEARANCE FROM THE GROUND.

HORIZONTAL OFFSET MAY BE ADJUSTED BASED ON FIELD CONDITIONS.

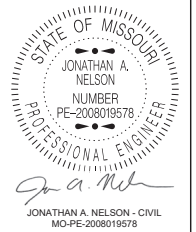
|                                                                                                                                                                                                                                  |                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                                                                                      |
|                                                                                                                                             | <b>SIGN MOUNTING DETAILS</b><br><b>MOUNTING HEIGHT &amp; OFFSET</b><br><b>PIPE POSTS, PSST, WOOD</b><br><b>&amp; U-CHANNEL POSTS</b> |

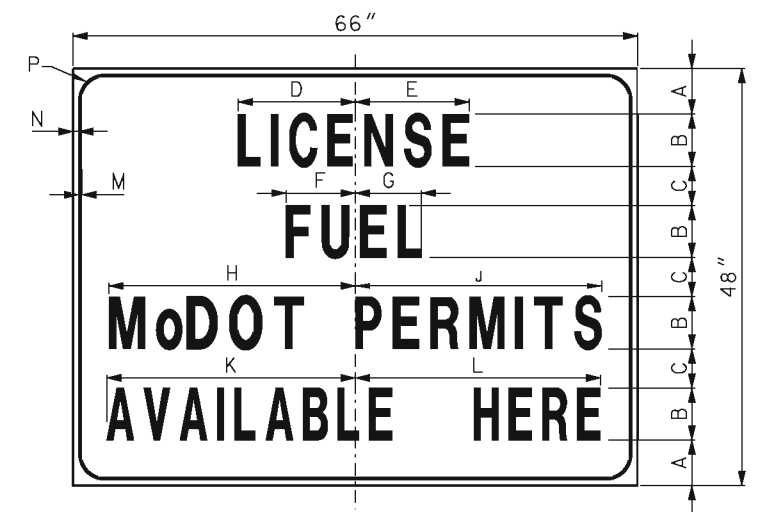
|                 |           |          |                       |
|-----------------|-----------|----------|-----------------------|
| DATE EFFECTIVE: | 10/1/2025 | 903.03BU | SHEET NO.<br>11 OF 12 |
| DATE PREPARED:  | 7/7/2025  |          |                       |

MOUNTING HEIGHT DETAILS



- (1) PERFORATED SQUARE STEEL TUBE 2" X 2" (O.D.) 12 GAGE. TUBE SHALL EXTEND A MINIMUM OF 6" BELOW THE TOP OF THE FOUNDATION TUBE.
- (2) TUBE TO EXTEND ABOVE FOUNDATION ONLY ENOUGH TO ALLOW BOLT TO BE INSERTED, 2 1/2" MAXIMUM.
- (3) SEE SEC 903 FOR CONCRETE MATERIAL REQUIREMENTS. POLYURETHANE FOAM IS NOT AN ALLOWABLE OPTION.
- (4) 2 1/2" x 2 1/2" (O.D.) SQUARE TUBE GALVANIZED 7 GAGE WITH TWO 17/32" DIAMETER HOLES IN EACH FACE 3/4" BELOW TOP OF TUBE.
- (5) 1/8" x 5' LONG STAINLESS STEEL CABLE (ASTM A 492 TYPE 304 MINIMUM BREAKING STRENGTH 200 LBS.) WITH A 1" DIA. LOOP AT EACH END LOOPS FORMED BY MECHANICAL CRIMP TYPE CONNECTION PER MANUFACTURER'S SPECIFICATIONS. CABLE IS TO BE RUN INSIDE PERFORATED SQUARE STEEL TUBE. CABLE IS TO BE USED ONLY WHEN SIGN MOUNTING LOCATION IS OVER ANOTHER TRAVELED WAY.
- (6) 1/2" DIAMETER RESIN ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH SEC 1039. AN APPROVED MECHANICAL TYPE ANCHOR MAY BE USED IF THE DEVICE EQUALS OR EXCEEDS THE PULL TEST REQUIREMENTS OF SEC 1039.
- (7) FALL ARREST CABLE TO BE SECURED TO NEXT FULL HOLE BELOW SIGN.

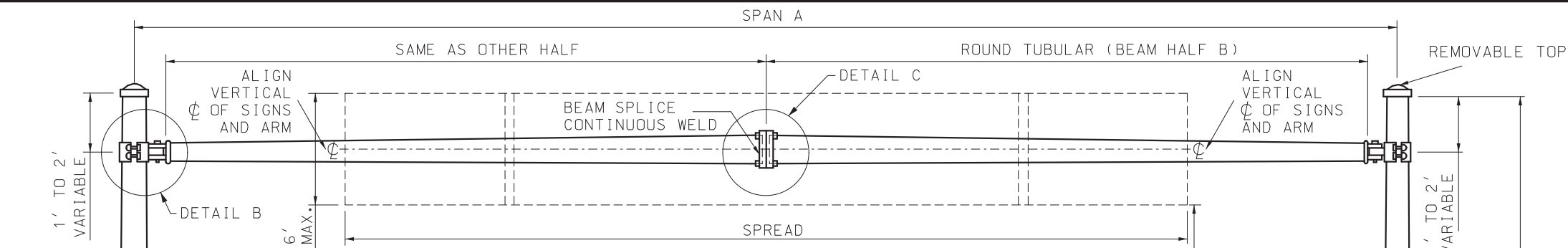
|                                                                                                                                              |                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> |                                                              |
| 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                             |                                                              |
|                                                         | <b>SIGN MOUNTING DETAILS<br/>EMERGENCY REFERENCE MARKERS</b> |
| DATE EFFECTIVE: 10/1/2025<br>DATE PREPARED: 7/7/2025                                                                                         | 903.03BU                                                     |
| SHEET NO. 12 OF 12                                                                                                                           |                                                              |



| GENERAL SIGN DATA |       |                          |       |               |
|-------------------|-------|--------------------------|-------|---------------|
| SHR1L-1           | TYPE  | REFLECTIVE SHEETING TYPE | COLOR | LETTER SERIES |
| BACKGROUND        |       | 1                        | WHITE |               |
| LEGEND            | L-1   |                          | BLACK | C             |
| SYMBOLS           |       |                          |       |               |
| BORDER            | L-1   |                          | BLACK |               |
| SUBSTRATE         | SHEET |                          |       |               |

|                            |         |           |
|----------------------------|---------|-----------|
| DATE EFFECTIVE: 02/01/2012 | 903.04F | SHEET NO. |
| DATE PREPARED: 12/19/2011  |         | 1 OF 1    |

### GUIDE SIGN DETAIL



| SPAN A | SPREAD FEET |     |     |     |     |                   |     |     |     |     |     |     |
|--------|-------------|-----|-----|-----|-----|-------------------|-----|-----|-----|-----|-----|-----|
|        | 15          | 20  | 25  | 30  | 35  | 40                | 45  | 50  | 55  | 60  | 65  | 70  |
| 31'-6" | 143         | 152 |     |     |     | MAXIMUM SIGN AREA |     |     |     |     |     |     |
| 35'-0" | 126         | 138 | 153 |     |     | SQUARE FEET       |     |     |     |     |     |     |
| 41'-3" | 106         | 120 | 130 | 144 |     |                   |     |     |     |     |     |     |
| 41'-6" | 124         | 134 | 144 | 155 |     |                   |     |     |     |     |     |     |
| 45'-0" | 102         | 112 | 121 | 132 | 144 |                   |     |     |     |     |     |     |
| 51'-3" | 78          | 88  | 98  | 108 | 118 | 129               |     |     |     |     |     |     |
| 51'-6" | 109         | 119 | 129 | 141 | 154 | 168               |     |     |     |     |     |     |
| 55'-0" | 88          | 98  | 108 | 119 | 131 | 142               | 155 |     |     |     |     |     |
| 61'-3" | 69          | 80  | 91  | 101 | 110 | 121               | 130 | 142 |     |     |     |     |
| 61'-6" |             | 115 | 124 | 133 | 144 | 157               | 170 | 182 |     |     |     |     |
| 65'-0" |             | 98  | 107 | 117 | 128 | 140               | 152 | 164 | 176 |     |     |     |
| 71'-3" |             | 80  | 89  | 98  | 109 | 121               | 132 | 144 | 156 | 164 |     |     |
| 71'-6" |             | 110 | 121 | 131 | 142 | 152               | 162 | 173 | 184 | 197 |     |     |
| 75'-0" |             | 94  | 104 | 114 | 124 | 139               | 144 | 154 | 165 | 176 | 187 |     |
| 81'-3" |             | 84  | 94  | 104 | 116 | 126               | 131 | 146 | 157 | 168 | 179 | 190 |

W=40 POUNDS PER SQUARE FOOT.

| TYPE NO. | SPAN A             | BEAM HALF B |                    | END POST |     |
|----------|--------------------|-------------|--------------------|----------|-----|
|          |                    | GA.         | DIMENSIONS         | GA.      | D   |
| S-1310   | 31'-6" THRU 41'-3" | 3           | 8.8" x 6" x 20'    | 3        | 10" |
| S-1310   | 41'-6" THRU 51'-3" | 3           | 9.5" x 6" x 25'    | 3        | 10" |
| S-1310   | 51'-6" THRU 61'-3" | 3           | 10.5" x 6.3" x 30' | 3        | 10" |
| S-1312   | 61'-6" THRU 71'-3" | 7           | 14" x 9.1" x 35'   | 3        | 12" |
| S-1312   | 71'-6" THRU 81'-3" | 7           | 16" x 10.4" x 40'  | 3        | 12" |

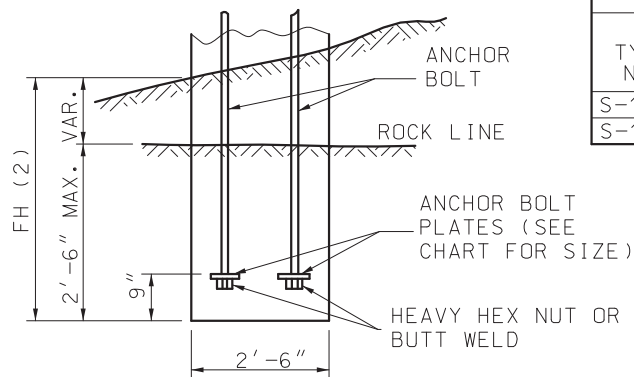
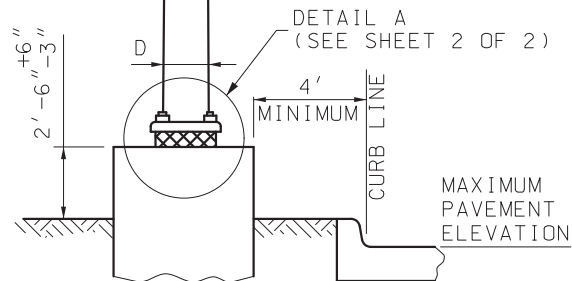
NOTES:  
DESIGN SPANS IN EVEN 3" INCREMENTS. SPECIFY SPAN A REQUIRED. FOR SPAN LENGTHS LESS THAN MAXIMUM FOR A DESIGNATED RANGE, THE LARGER DIAMETER OF THE CROSS BEAM IS HELD AND THE SMALLER DIAMETER WILL INCREASE AS LENGTH IS REDUCED. DESIGN POSTS IN EVEN 1' INCREMENTS.

| TYPE NO. | DIA. FD | ESTIMATED QUANTITIES FOOTING |          |                   |        |       |       |
|----------|---------|------------------------------|----------|-------------------|--------|-------|-------|
|          |         | CLASS B CONCRETE             |          | REINFORCING STEEL |        |       |       |
|          |         | 1' DEPTH                     | 1" DEPTH | #5                | #4 (3) | TOTAL |       |
| S-1310   | 2'-6"   | 0.1818                       | 0.01515  | 6                 | 8'-9"  | 10    | 7'-2" |
| S-1312   | 2'-6"   | 0.1818                       | 0.01515  | 6                 | 10'-3" | 12    | 7'-2" |

(3) ESTIMATED QUANTITY FOR REINFORCING STEEL IS BASED ON A 1V:2H SLOPE.

| MODIFIED FOOTING IN SOLID ROCK |                 |                        |
|--------------------------------|-----------------|------------------------|
| TYPE NO.                       | ANCHOR BOLT (1) | ANCHOR BOLT PLATE      |
| S-1310                         | 1 1/2" DIA.     | 3 1/2" x 3 1/2" x 3/4" |
| S-1312                         | 1 3/4" DIA.     | 3 1/2" x 3 1/2" x 3/4" |

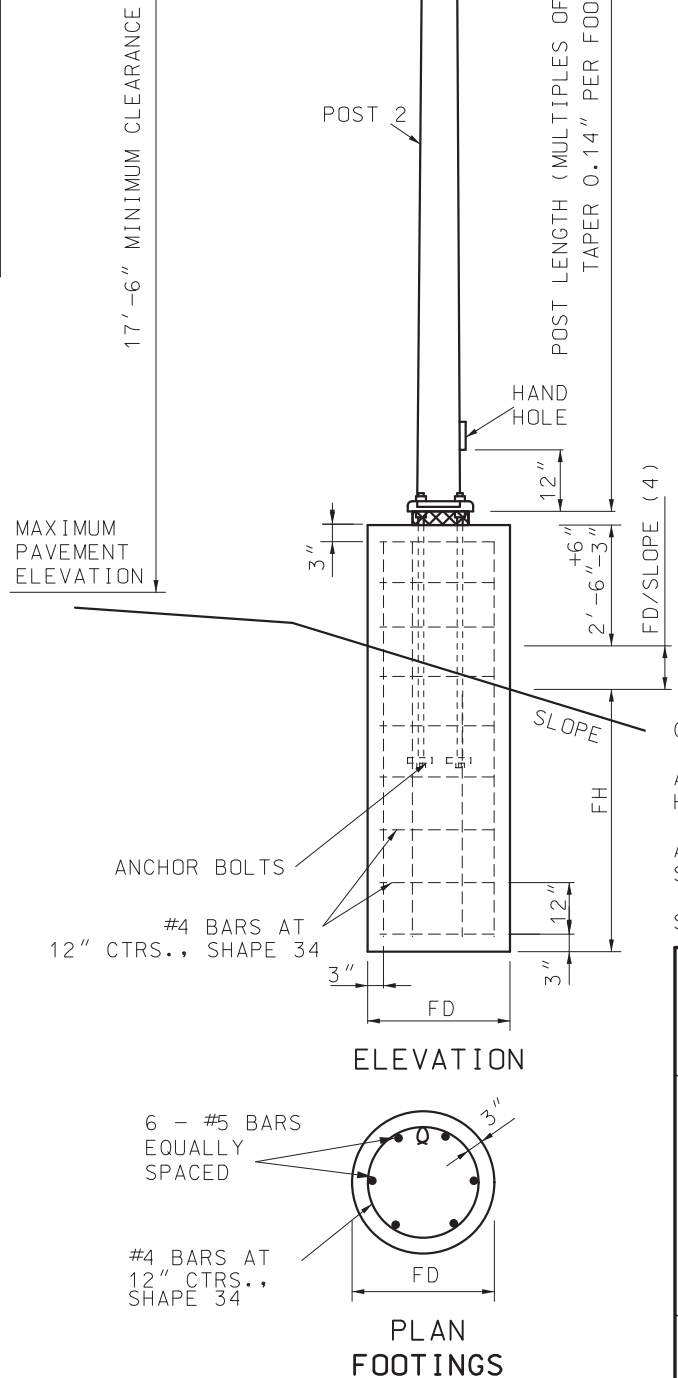
(1) ANCHOR BOLT LENGTH AS REQUIRED



REINFORCEMENT PLACED SAME AS STANDARD FOOTING. CONCRETE TO BE POURED TO EXCAVATED FACE OF ROCK.

### MODIFIED FOOTING IN SOLID ROCK

(2) NOT TO EXCEED 5' FOR S-1310, NOT TO EXCEED 6'-6" FOR S-1312.



(4) EXAMPLE: IF SLOPE IS 1V:6H, THE DENOMINATOR IS 6

#### GENERAL NOTES:

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL C OF THE ARM.

ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED HIGH STRENGTH ANCHOR BOLTS.

SEE SHEET 2 OF 2 FOR DETAILS A, B AND C.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**HIGHWAY SIGNING**

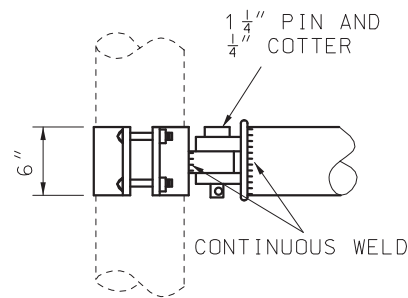
**TUBULAR SUPPORT STEEL**

**TYPE S**

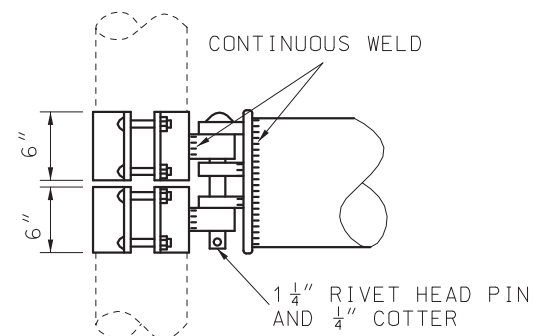
**ONE TUBE**

|                 |            |                |                     |
|-----------------|------------|----------------|---------------------|
| DATE EFFECTIVE: | 10/01/2022 | <b>903.05L</b> | SHEET NO.<br>1 OF 2 |
| DATE PREPARED:  | 3/12/2025  |                |                     |



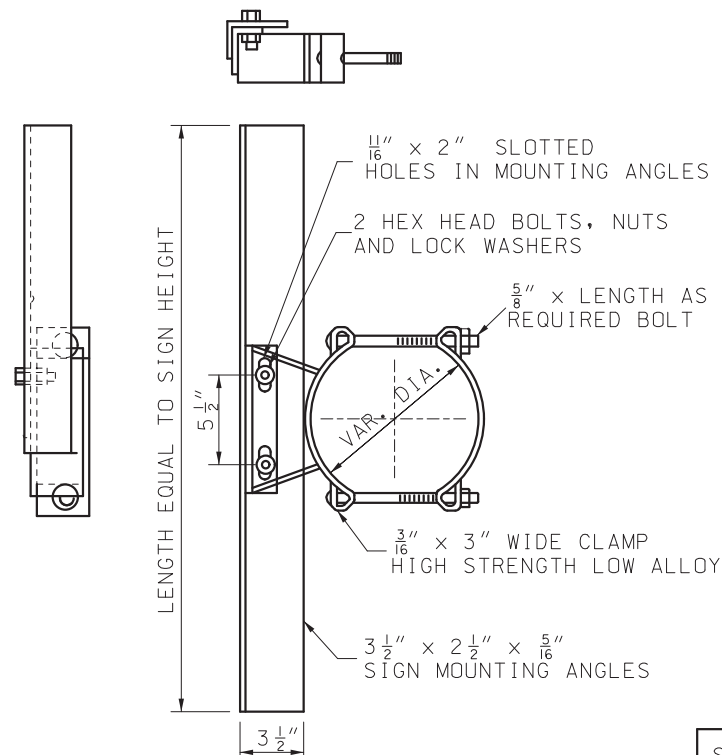


TUBE DIAMETER EQUAL TO  
OR LESS THAN 10 1/2"  
AT CENTER OF SPAN



TUBE DIAMETER GREATER THAN 10 1/2"  
AT CENTER OF SPAN

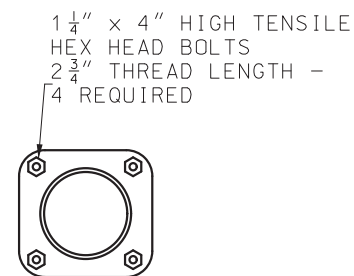
DETAIL B  
BEAM CLAMP



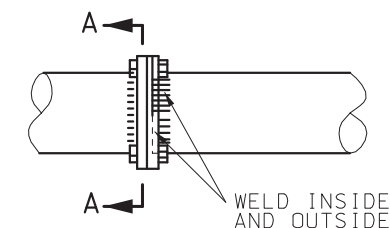
NOTE:  
MINIMUM OF TWO BRACKETS ARE REQUIRED  
FOR SIGNS OVER 42" IN LENGTH.

GALVANIZED SIGN  
BRACKET ASSEMBLY

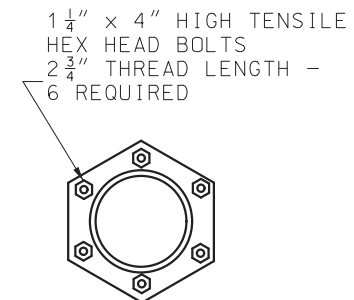
| SIGN HEIGHT<br>(INCHES) | MAXIMUM LIN. FT.<br>OF SIGN WIDTH<br>PER BRACKET |
|-------------------------|--------------------------------------------------|
| 48 & UNDER              | 13                                               |
| 60                      | 8                                                |
| 72                      | 5                                                |



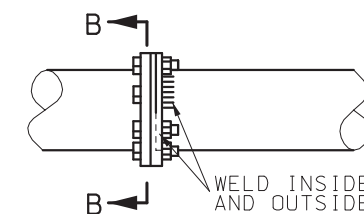
SECTION A-A



TUBE DIAMETER 9 1/2"  
AND UNDER

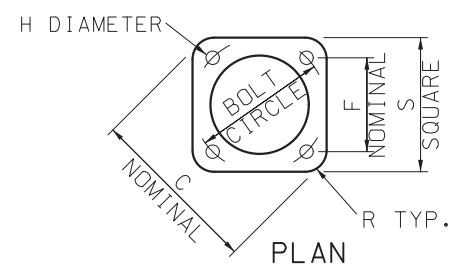


SECTION B-B

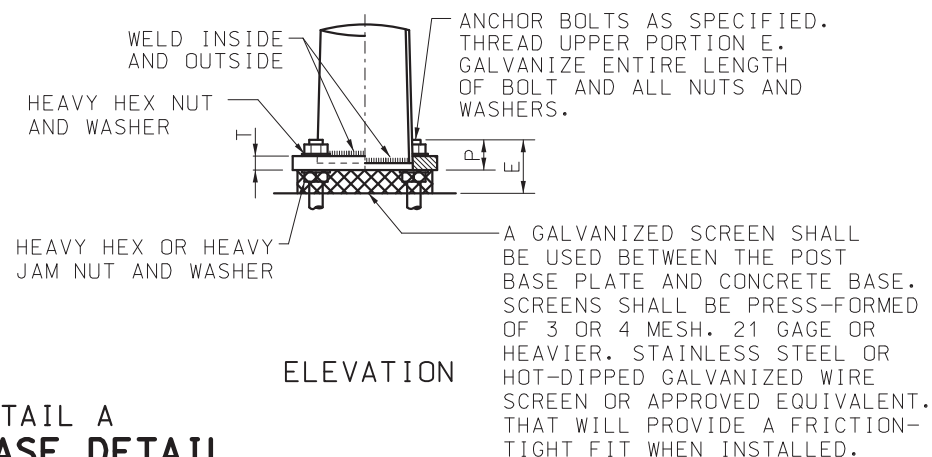


TUBE DIAMETER  
OVER 9 1/2"

DETAIL C  
BEAM SPLICE



DETAIL A  
POST BASE DETAIL





MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



STATE OF MISSOURI  
NICOLE A. KOLB HOOD  
NUMBER  
PE-2001018754  
PROFESSIONAL ENGINEER

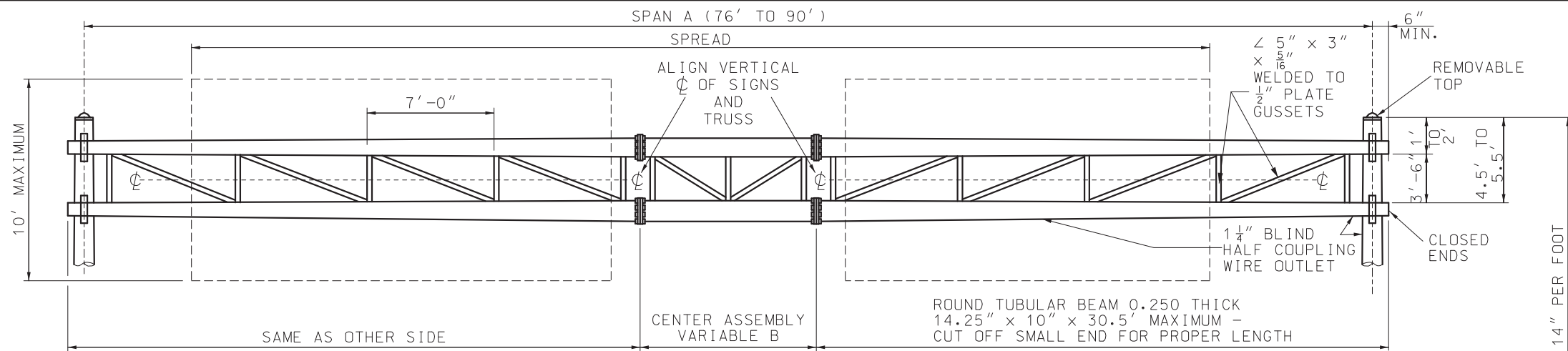
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

**HIGHWAY SIGNING**

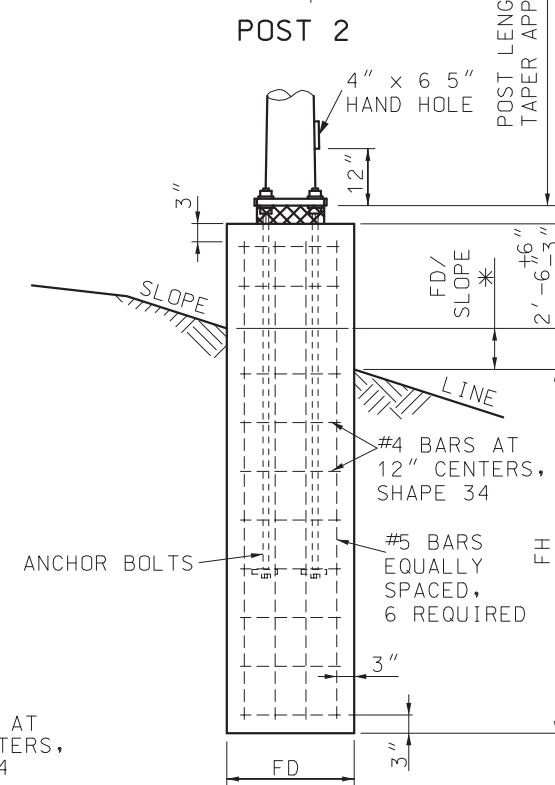
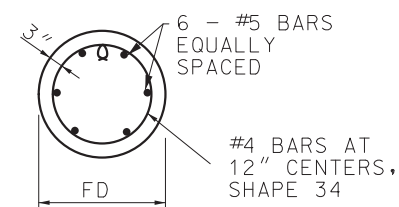
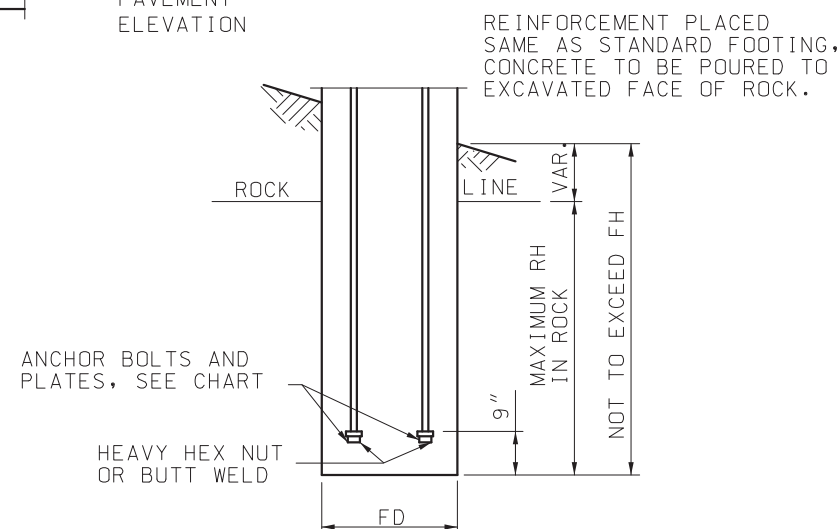
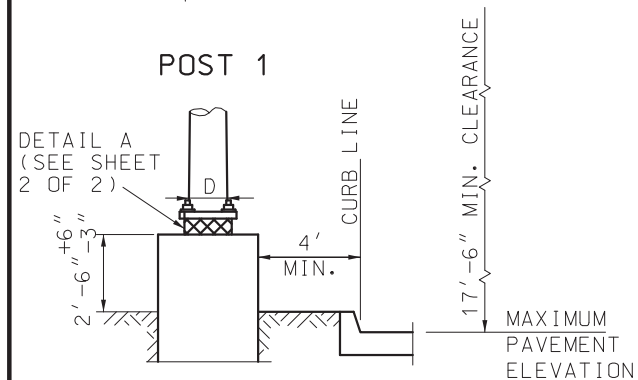
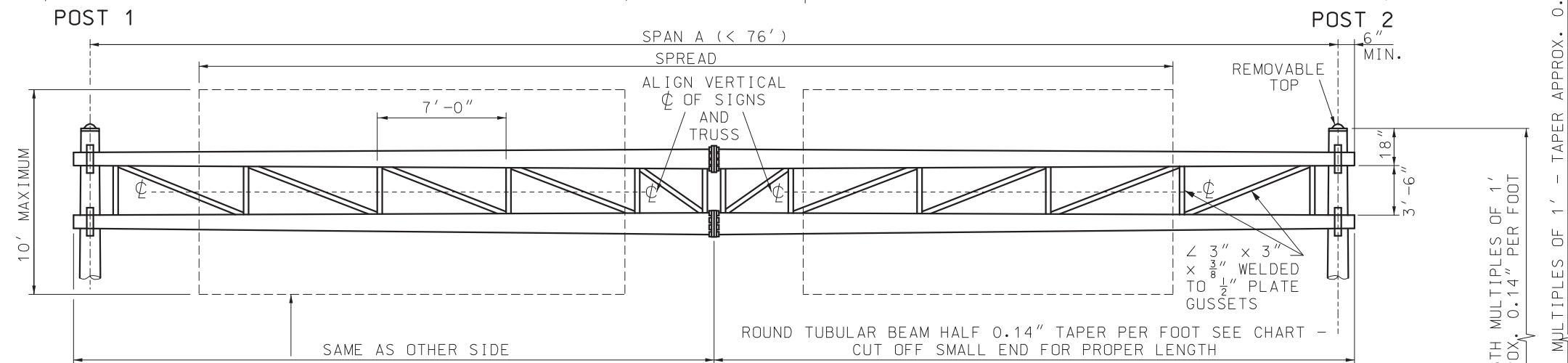
TUBULAR SUPPORT STEEL  
TYPE S  
ONE TUBE

|                 |            |                |                     |
|-----------------|------------|----------------|---------------------|
| DATE EFFECTIVE: | 10/01/2022 | <b>903.05L</b> | SHEET NO.<br>2 OF 2 |
| DATE PREPARED:  | 7/19/2022  |                |                     |





| TWO END POST |     |             |                             |
|--------------|-----|-------------|-----------------------------|
| TYPE         | GA  | D<br>INCHES | ALLOWABLE<br>MOMENT-FT-LBS. |
| S-2315       | 3   | 15          | 120 000                     |
| S-2316.5     | 3   | 16.5        | 147 000                     |
| S-2318       | 3   | 18          | 177 000                     |
| S-27716      | 7+7 | 16          | 214 000                     |
| S-2018       | 0   | 18          | 222 000                     |
| S-27718      | 7+7 | 18          | 255 000                     |
| S-23316.5    | 3+3 | 16.5        | 292 000                     |
| S-23317      | 3+3 | 17          | 328 000                     |
| S-20018      | 0+0 | 18          | 453 000                     |



\* EXAMPLE: IF SLOPE  
IS 1V:6H, THE  
DENOMINATOR IS 6

GENERAL NOTES:

USE LONGEST POST AND SPAN A (NEXT GREATER IF NOT CHARTED) TO DETERMINE END POSTS AND STRUCTURE DESIGNS. MAXIMUM SIGN AREA FOR GIVEN SPREAD (INTERPOLATE FOR UNCHARTED SPREADS) NOT TO BE EXCEEDED. SUPPORTS DESIGNED BY END POST TYPE AND SPAN A (I.E. S-2315-40 ETC.).

ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED HIGH STRENGTH ANCHOR BOLTS.

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL C OF THE TRUSS.

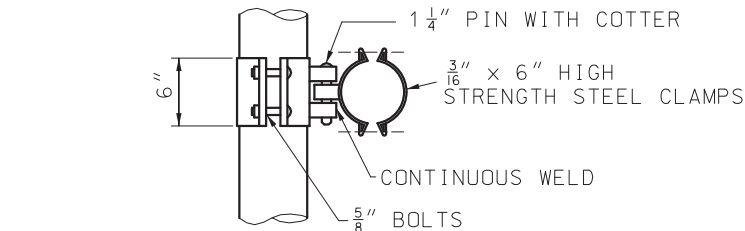
|                                                                                       |                                                                                                                                                                                          |                                            |  |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--|
|  | <p align="center"><b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b></p> <p align="right">105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                            |  |
|  | <p align="center"><b>HIGHWAY SIGNING</b></p> <p align="center">TUBULAR SUPPORT STEEL<br/>TYPE S<br/>TWO TUBES</p>                                                                        |                                            |  |
| <p>DATE EFFECTIVE: <u>10/01/2022</u></p> <p>DATE PREPARED: <u>7/19/2022</u></p>       | <p align="center"><b>903.06L</b></p>                                                                                                                                                     | <p align="center">SHEET NO.<br/>1 OF 2</p> |  |

| SPAN<br>A | SPREAD IN FEET |               |           |                |      |        |                         |     |     |     |     |     |     |   | STRUCTURE     |       |         | POSTS FOR MAXIMUM AREA |          |          |          |          |           |           |           |           |         |                  |         |
|-----------|----------------|---------------|-----------|----------------|------|--------|-------------------------|-----|-----|-----|-----|-----|-----|---|---------------|-------|---------|------------------------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|---------|------------------|---------|
|           |                |               |           |                |      |        |                         |     |     |     |     |     |     |   | TUBULAR BEAMS |       |         |                        |          |          |          |          |           |           |           |           |         | CENTER SECTION B |         |
|           | GA             | LARGE<br>DIA. | MIN.<br>L | THICK-<br>NESS | O.D. | LENGTH | LENGTH OF POSTS IN FEET |     |     |     |     |     |     |   |               |       |         |                        |          |          |          |          |           |           |           |           |         |                  |         |
| FEET      | 30             | 35            | 40        | 45             | 50   | 55     | 60                      | 65  | 70  | 75  | 80  | 85  | 90  |   |               |       | 18      | 19                     | 20       | 21       | 22       | 23       | 24        | 25        | 26        | 27        |         |                  |         |
| 40        | 300            |               |           |                |      |        |                         |     |     |     |     |     |     | 3 | 9.5"          | 20.5' | S-2315  | S-2315                 | S-2315   | S-2316.5 | S-2316.5 | S-2316.5 | S-2318    | S-2318    | S-2318    | S-2318    |         |                  |         |
| 45        | 264            | 288           |           |                |      |        |                         |     |     |     |     |     |     | 3 | 9.5"          | 23.0' | S-2315  | S-2315                 | S-2315   | S-2316.5 | S-2316.5 | S-2316.5 | S-2318    | S-2318    | S-2318    | S-2318    |         |                  |         |
| 50        | 282            | 308           | 336       |                |      |        |                         |     |     |     |     |     |     | 3 | 10.5"         | 25.5' | S-2315  | S-2316.5               | S-2316.5 | S-2316.5 | S-2318   | S-2318   | S-2318    | S-27716   | S-27716   | S-27716   |         |                  |         |
| 55        | 238            | 262           | 284       | 310            |      |        |                         |     |     |     |     |     |     | 3 | 10.5"         | 28.0' | S-2315  | S-2316.5               | S-2316.5 | S-2316.5 | S-2318   | S-2318   | S-2318    | S-2318    | S-27716   | S-27716   |         |                  |         |
| 60        | 266            | 288           | 314       | 340            | 364  |        |                         |     |     |     |     |     |     | 7 | 14.0"         | 30.5' | S-2318  | S-27716                | S-27716  | S-27716  | S-2018   | S-27718  | S-27718   | S-27718   | S-23316.5 | S-23316.5 |         |                  |         |
| 65        | 234            | 256           | 280       | 304            | 328  | 352    |                         |     |     |     |     |     |     | 7 | 14.0"         | 33.0' | S-2318  | S-27716                | S-27716  | S-27716  | S-27716  | S-27718  | S-27718   | S-27718   | S-23316.5 | S-23316.5 |         |                  |         |
| 70        | 262            | 284           | 304       | 324            | 346  | 368    | 394                     |     |     |     |     |     |     | 3 | 14.0"         | 35.5' | S-27716 | S-27716                | S-27716  | S-27718  | S-27718  | S-27718  | S-23316.5 | S-23316.5 | S-23316.5 | S-23317   |         |                  |         |
| 75        | 228            | 248           | 268       | 288            | 308  | 330    | 352                     | 374 |     |     |     |     |     | 3 | 14.0"         | 38.0' | S-27716 | S-27716                | S-27716  | S-2018   | S-27718  | S-27718  | S-27718   | S-23316.5 | S-23316.5 | S-23316.5 |         |                  |         |
| 76        | 295            | 308           | 326       | 350            | 370  | 397    | 425                     | 450 | 472 | 502 |     |     |     | 3 | 14.25"        | 30.5' | 312"    | 14.238"                | 16'      | S-27716  | S-27718  | S-27718  | S-27718   | S-23316.5 | S-23316.5 | S-23317   | S-23317 | S-20018          |         |
| 79        | 310            | 326           | 347       | 366            | 384  | 410    | 432                     | 460 | 490 | 520 |     |     |     | 3 | 14.25"        | 28.5' | 312"    | 14.238"                | 23'      | S-2018   | S-27718  | S-27718  | S-23316.5 | S-23316.5 | S-23317   | S-23317   | S-20018 | S-20018          |         |
| 83        | 277            | 288           | 300       | 322            | 340  | 360    | 385                     | 412 | 434 | 465 | 498 |     |     | 3 | 14.25"        | 30.5' | 312"    | 14.238"                | 23'      | S-27716  | S-2018   | S-27718  | S-27718   | S-23316.5 | S-23316.5 | S-23316.5 | S-23317 | S-20018          |         |
| 86        | 297            | 309           | 322       | 337            | 356  | 378    | 402                     | 425 | 447 | 473 | 500 | 522 |     | 3 | 14.25"        | 28.0' | 312"    | 14.238"                | 30'      | S-2018   | S-27718  | S-27718  | S-23316.5 | S-23316.5 | S-23317   | S-23317   | S-20018 | S-20018          |         |
| 90        | 269            | 280           | 294       | 310            | 327  | 345    | 363                     | 385 | 403 | 426 | 446 | 466 | 485 | 3 | 14.25"        | 30.5' | 312"    | 14.238"                | 30'      | S-27716  | S-27718  | S-27718  | S-23316.5 | S-23316.5 | S-23316.5 | S-23317   | S-23317 | S-20018          | S-20018 |

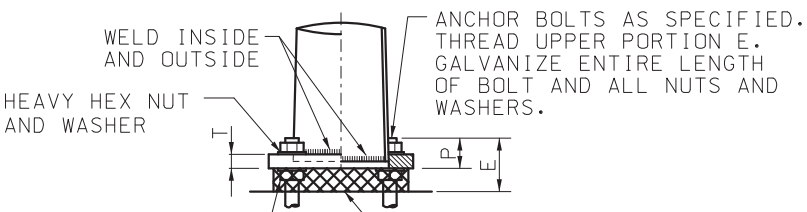
| BASE DATA |                     |                     |                     |                    |                    |                    |                     |                    |                     | FOOTINGS |     |                    |        |               |                    |                              |                     | ESTIMATED QUANTITIES OF STANDARD FOOTINGS |         |                   |        |         |           |      |
|-----------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|----------|-----|--------------------|--------|---------------|--------------------|------------------------------|---------------------|-------------------------------------------|---------|-------------------|--------|---------|-----------|------|
| TYPE NO.  | BOLT CIRCLE         | C                   | F                   | H                  | P                  | R                  | S                   | T                  | E                   | IN EARTH |     |                    |        | IN SOLID ROCK |                    |                              |                     | CLASS B CONC                              |         | REINFORCING STEEL |        | TOTAL   |           |      |
|           |                     |                     |                     |                    |                    |                    |                     |                    |                     | DIA. FD  | FH  | ANCHOR BOLTS       |        | RH MAX        | ANCHOR BOLTS       |                              | PLATES              | CY/FT                                     | CY/IN   | #5 BARS           |        |         | #4 BARS * | LBS. |
|           |                     |                     |                     |                    |                    |                    |                     |                    |                     |          |     | DIA.               | LENGTH |               | DIA.               | LENGTH                       |                     |                                           |         | NO.               | LENGTH |         | NO.       |      |
| S-2315    | 22"                 | 28 <sup>5⁄8</sup> " | 15 <sup>1⁄2</sup> " | 2 <sup>3⁄8</sup> " | 4 <sup>3⁄4</sup> " | 4 <sup>5⁄8</sup> " | 23"                 | 2"                 | 8 <sup>1⁄2</sup> "  | 2'-6"    | 8'  | 2"                 | 96"    | 3'            | 2"                 | AS REQUIRED SEE ROCK FOOTING | 3.5" x 3.5" x 0.75" | 0.1818                                    | 0.01515 | 6                 | 11'-9" | 13      | 7'-2"     | 136  |
| S-2316.5  | 23 <sup>1⁄2</sup> " | 30 <sup>1⁄2</sup> " | 16 <sup>5⁄8</sup> " | 2"                 | 4 <sup>3⁄4</sup> " | 5"                 | 24 <sup>1⁄2</sup> " | 2"                 | 8 <sup>1⁄2</sup> "  | 3'-0"    | 10' | 2"                 | 96"    | 3'            | 2"                 |                              | 3.5" x 3.5" x 0.75" | 0.2618                                    | 0.0218  | 6                 | 14'-0" | 15      | 8'-9"     | 176  |
| S-2318    | 25 <sup>1⁄2</sup> " | 33"                 | 18"                 | 2"                 | 4 <sup>3⁄4</sup> " | 5 <sup>1⁄2</sup> " | 26 <sup>1⁄2</sup> " | 2"                 | 8 <sup>1⁄2</sup> "  | 3'-0"    | 10' | 2"                 | 96"    | 3'            | 2"                 |                              | 3.5" x 3.5" x 0.75" | 0.2618                                    | 0.0218  | 6                 | 14'-0" | 15      | 8'-9"     | 176  |
| S-27716   | 23 <sup>1⁄2</sup> " | 30 <sup>1⁄2</sup> " | 16 <sup>5⁄8</sup> " | 2"                 | 5 <sup>1⁄2</sup> " | 5"                 | 24 <sup>1⁄2</sup> " | 2 <sup>1⁄2</sup> " | 9 <sup>1⁄2</sup> "  | 3'-0"    | 10' | 2 <sup>1⁄4</sup> " | 96"    | 3'            | 2 <sup>1⁄4</sup> " |                              | 4.5" x 4.5" x 0.75" | 0.2618                                    | 0.0218  | 6                 | 14'-0" | 15      | 8'-9"     | 176  |
| S-2018    | 25 <sup>1⁄2</sup> " | 33"                 | 18"                 | 2"                 | 5 <sup>1⁄2</sup> " | 5 <sup>1⁄2</sup> " | 26 <sup>1⁄2</sup> " | 2 <sup>1⁄2</sup> " | 9 <sup>1⁄2</sup> "  | 3'-6"    | 11' | 2 <sup>1⁄4</sup> " | 96"    | 4'            | 2 <sup>1⁄4</sup> " |                              | 4.5" x 4.5" x 0.75" | 0.3563                                    | 0.0297  | 6                 | 15'-3" | 17      | 10'-4"    | 212  |
| S-27718   | 25 <sup>1⁄2</sup> " | 33"                 | 18"                 | 2"                 | 6"                 | 5 <sup>1⁄2</sup> " | 26 <sup>1⁄2</sup> " | 2 <sup>1⁄2</sup> " | 10 <sup>1⁄2</sup> " | 3'-6"    | 11' | 2 <sup>1⁄2</sup> " | 120"   | 4'            | 2 <sup>1⁄2</sup> " |                              | 5" x 5" x 1"        | 0.3563                                    | 0.0297  | 6                 | 15'-3" | 17      | 10'-4"    | 212  |
| S-23316.5 | 23 <sup>1⁄2</sup> " | 30 <sup>1⁄2</sup> " | 16 <sup>5⁄8</sup> " | 3"                 | 7"                 | 5"                 | 24 <sup>1⁄2</sup> " | 3"                 | 12"                 | 3'-6"    | 12' | 3"                 | 144"   | 4'            | 3"                 |                              | 5" x 5" x 1"        | 0.3563                                    | 0.0297  | 6                 | 16'-3" | 18      | 10'-4"    | 226  |
| S-23317   | 25 <sup>1⁄2</sup> " | 33"                 | 18"                 | 3"                 | 7"                 | 5 <sup>1⁄2</sup> " | 26 <sup>1⁄2</sup> " | 3"                 | 12"                 | 3'-6"    | 12' | 3"                 | 144"   | 4'            | 3"                 |                              | 5" x 5" x 1"        | 0.3563                                    | 0.0297  | 6                 | 16'-3" | 18      | 10'-4"    | 226  |
| S-20018   | 25 <sup>1⁄2</sup> " | 33"                 | 18"                 | 3"                 | 7"                 | 5 <sup>1⁄2</sup> " | 26 <sup>1⁄2</sup> " | 3"                 | 12"                 | 4'-0"    | 12' | 3"                 | 144"   | 5'            | 3"                 | 5" x 5" x 1"                 | 0.4654              | 0.0388                                    | 6       | 16'-6"            | 18     | 11'-10" | 245       |      |

\* ESTIMATED QUANTITY FOR REINFORCING STEEL IS BASED ON A 2:1 (H:V) SLOPE.

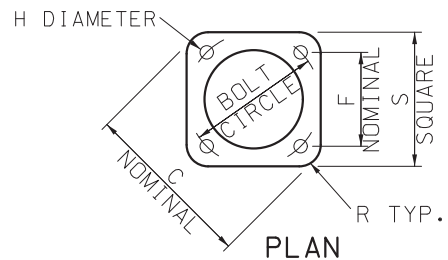
| TUBE DIA. | A       | B       | NO. OF BOLTS |
|-----------|---------|---------|--------------|
| 9 1/2"    | 11 1/2" | 12 1/2" | 4            |
| 10 1/2"   | 14 5/8" | 14"     | 4            |
| 14.0"     | 17 1/4" | 17"     | 6            |



BEAM CLAMP DETAIL

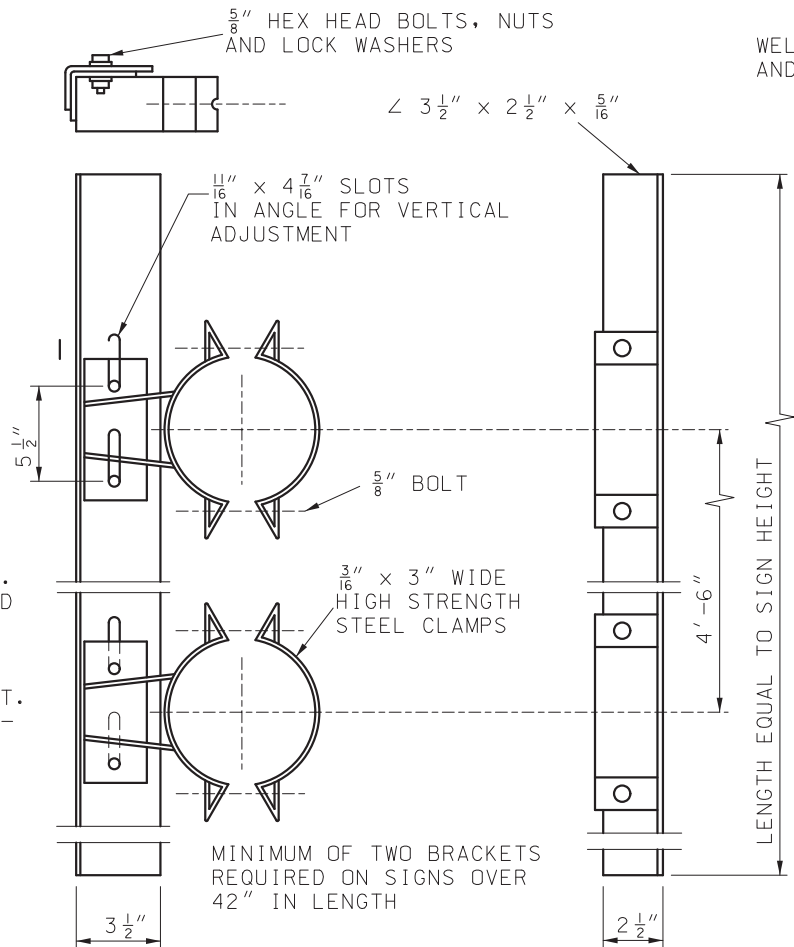


ELEVATION

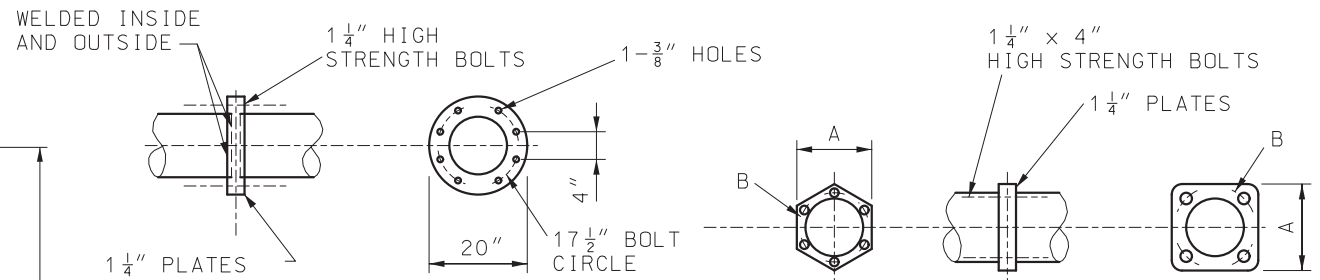


DETAIL A

POST BASE DETAIL



GALVANIZED SIGN BRACKET ASSEMBLY



SPANS 76' TO 90'

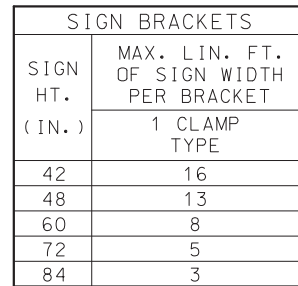
BEAM SPLICE DETAIL

SPANS UP TO 76'

| SIGN HEIGHT INCHES | MAX. LIN. FT. OF SIGN WIDTH PER BRACKET |
|--------------------|-----------------------------------------|
| 48 & UNDER         | 16                                      |
| 60                 | 16                                      |
| 72                 | 15                                      |
| 84                 | 11                                      |
| 96                 | 6                                       |
| 108                | 4                                       |
| 120                | 3                                       |

|                                                                                                                                                                                                                                  |                                                                        |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                        |                |
| <br>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.                                                                            | <b>HIGHWAY SIGNING</b><br>TUBULAR SUPPORT STEEL<br>TYPE S<br>TWO TUBES |                |
|                                                                                                                                                                                                                                  | DATE EFFECTIVE: 10/01/2022<br>DATE PREPARED: 7/19/2022                 | <b>903.06L</b> |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



| ARM = 35 000 PSI |                   |            |      |      |                   |                     |
|------------------|-------------------|------------|------|------|-------------------|---------------------|
| TYPE<br>NUMBER   | ARM<br>DIMENSIONS |            | POST |      | MAX. SIGN<br>AREA | MAX. B<br>WITH MAX. |
|                  | LENGTH            | DIA. / THK | GA   | DIA. | SQ. FT.           | SIGN AREA           |
| C-1710-12        | 12'               | 6" STD     | 7    | 10"  | 41                | 8' - 0"             |
| C-1710-18        | 18'               | 0.280" THK |      |      |                   |                     |
| C-1310-12        | 12'               | 6" EX HVY  | 3    | 10"  | 59                | 8' - 9"             |
| C-1310-18        | 18'               | 0.432" THK |      |      |                   |                     |

$$\left( \frac{\text{MAX. B FOR TRUE SIGN AREA}}{\text{TRUE SIGN AREA}} \right) \leq \frac{\left( \frac{\text{MAX SIGN AREA}}{\text{AREA}} \right) \times \left( \frac{\text{MAX. B WITH MAX. SIGN AREA}}{\text{SIGN AREA}} \right)}{\left( \text{TRUE SIGN AREA} \right)}$$

**ELEVATION**

DETAIL A (SEE SHEET 2 OF 2)

HAND HOLE

12"

10"

4' MIN.

3"

CURB OR SHOULDER LINE

MAXIMUM PAVEMENT ELEVATION

2' - 6" - 3"

+6"

-3"

ANCHOR BOLTS

6-#5 BARS EQUALLY SPACED

HALF FH

3"

12"

3"

FD

#4 BARS AT 12" CTRS. SHAPE 34

**PLAN**

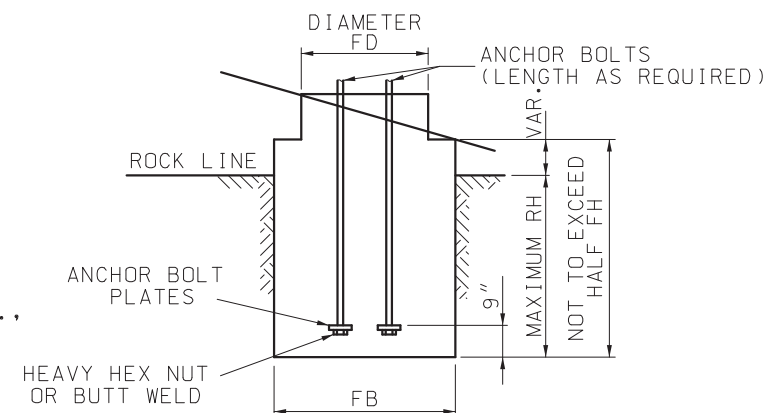
INGLE ARM CANTILEVER

#4 BARS AT 12" CTRS. SHAPE 34

SIX - #5 BARS EQUALLY SPACED

3"

FB



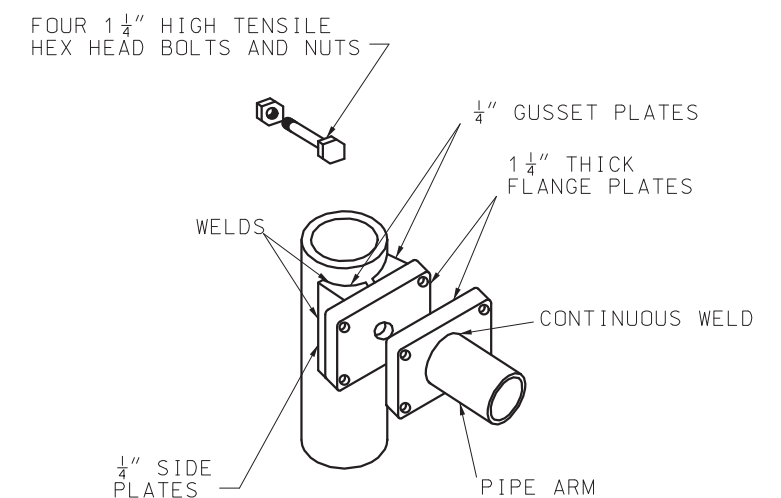
NOTE:  
REINFORCEMENT PLACED SAME AS  
STANDARD FOOTING. CONCRETE TO BE  
POURED TO EXCAVATED FACE OF ROCK.

## MODIFIED FOOTING IN SOLID ROCK

| ESTIMATED QUANTITIES |          |    |                                |          |            |          |                   |       |          |       |              |
|----------------------|----------|----|--------------------------------|----------|------------|----------|-------------------|-------|----------|-------|--------------|
| TYPE<br>NUMBER       | DIAMETER |    | CU YD CLASS B CONCRETE FOOTING |          |            |          | REINFORCING STEEL |       |          |       |              |
|                      |          |    | FD SECTION                     |          | FB SECTION |          | #5                |       | #4 ( 1 ) |       | TOTAL<br>LBS |
|                      | FD       | FB | 1' DEPTH                       | 1" DEPTH | 1' DEPTH   | 1" DEPTH | NO.               | FT-IN | NO.      | FT-IN |              |
| C-1710               | 2'       | 4' | 0.11635                        | 0.0097   | 0.2645     | 0.0220   | 6                 | 7'-6" | 9        | 5'-7" | 81           |
| C-1310               | 2'       | 4' | 0.11635                        | 0.0097   | 0.2645     | 0.0220   | 6                 | 7'-6" | 9        | 5'-7" | 81           |

(1) ESTIMATED QUANTITY FOR REINFORCING STEEL IS BASED ON A 2:1 (H:V) SLOPE.

| MODIFIED FOOTING IN SOLID ROCK |                  |                        |         |       |       |                                             |          |  |
|--------------------------------|------------------|------------------------|---------|-------|-------|---------------------------------------------|----------|--|
| TYPE NUMBER                    | ANCHOR BOLT DIA. | ANCHOR BOLT PLATE      | FOOTING |       |       | CLASS B CONCRETE FOOTING FB SECTION CU. YD. |          |  |
|                                |                  |                        | RH      | FD    | FB    | 1' DEPTH                                    | 1" DEPTH |  |
| C-1710 & C-1310                | 1 1/2"           | 3 1/2" x 3 1/2" x 3/4" | 2'-6"   | 2'-0" | 3'-0" | 0.1904                                      | 0.0159   |  |
| C-2315                         | 2"               | 3 1/2" x 3 1/2" x 3/4" | 3'-0"   | 3'-0" | 3'-6" | 0.3173                                      | 0.0264   |  |
| C-2318                         | 2"               | 3 1/2" x 3 1/2" x 3/4" | 3'-6"   | 3'-6" | 3'-6" | 0.3563                                      | 0.0297   |  |
| C-2018                         | 2 1/4"           | 4 1/2" x 4 1/2" x 3/4" | 3'-6"   | 3'-6" | 3'-6" | 0.3563                                      | 0.0297   |  |

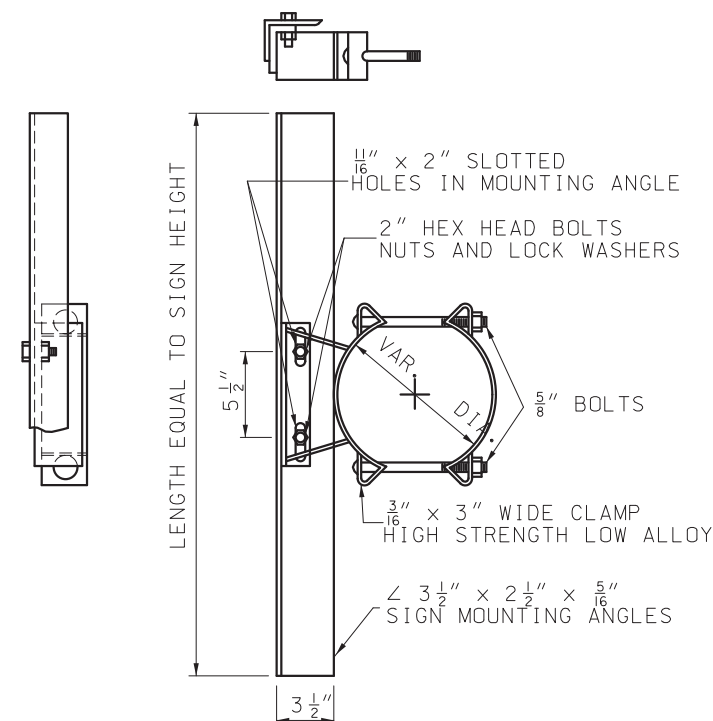


FOR POLE DIAMETER UNDER 12"  
**ARM ATTACHMENT**

GENERAL NOTE:

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL C OF THE ARM.

ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED HIGH STRENGTH ANCHOR BOLTS.

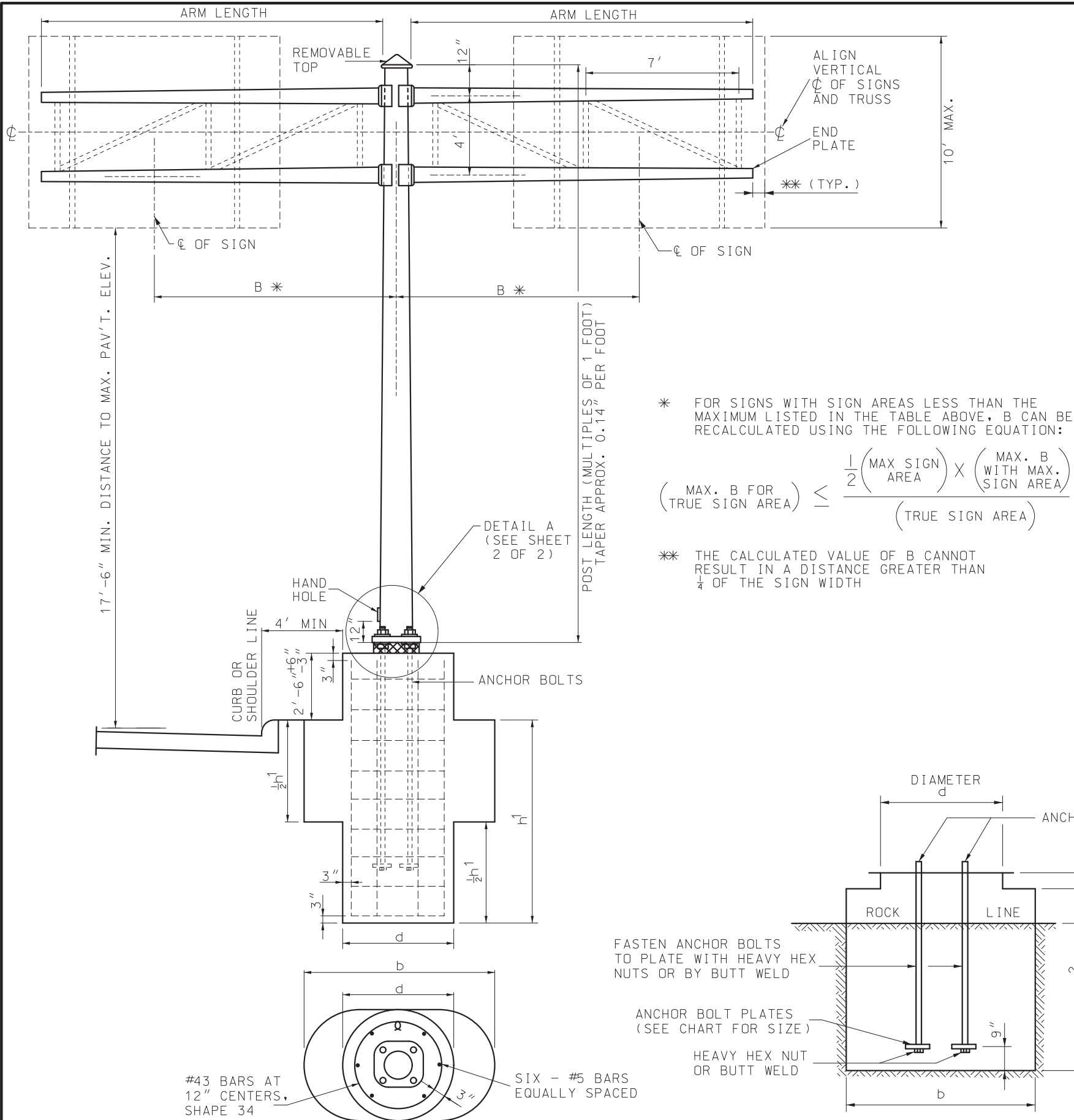


## GALVANIZED SIGN BRACKET ASSEMBLY

|                                                                                       |                                                                                  |  |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--|
|  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |  |
|                                                                                       | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |  |







\* FOR SIGNS WITH SIGN AREAS LESS THAN THE MAXIMUM LISTED IN THE TABLE ABOVE, B CAN BE RECALCULATED USING THE FOLLOWING EQUATION:

$$\left( \text{MAX. B FOR TRUE SIGN AREA} \right) \leq \frac{\frac{1}{2} \left( \text{MAX SIGN AREA} \right) \times \left( \text{MAX. B WITH MAX. SIGN AREA} \right)}{\left( \text{TRUE SIGN AREA} \right)}$$

\*\* THE CALCULATED VALUE OF B CANNOT RESULT IN A DISTANCE GREATER THAN 1/4 OF THE SIGN WIDTH

### MODIFIED FOOTINGS IN SOLID ROCK

| TYPE NUMBER | POST |      |      | ARM |                         | MAX. AREA (2) SQ. FT. |
|-------------|------|------|------|-----|-------------------------|-----------------------|
|             | GA.  | "B"* | DIA. | GA. | DIMENSIONS              |                       |
| B-2018      | 0    | 8'   | 18"  | 7   | 7.5" x 5.82" x 12'      | 260                   |
|             | 0    | 12'  | 18"  | 7   | 9.0" x 6.76" x 16'      | 240                   |
|             | 0    | 16'  | 18"  | 3   | 10.0" x 7.2" x 20'      | 230                   |
|             | 0    | 20'  | 18"  | 3   | 11.0" x 7.64" x 24' (1) | 200                   |
| B-23318     | 3+3  | 10'  | 18"  | 7   | 9" x 6.48" x 18'        | 290                   |
|             | 3+3  | 14'  | 18"  | 7   | 11" x 7.92" x 22' (1)   | 300                   |
|             | 3+3  | 18'  | 18"  | 7   | 12.5" x 8.86" x 26' (1) | 300                   |
| B-20018     | 0+0  | 14'  | 18"  | 7   | 12.5" x 9.14" x 24' (1) | 410                   |
|             | 0+0  | 18'  | 18"  | 3   | 12.5" x 8.58" x 28' (1) | 430                   |
|             | 0+0  | 24'  | 18"  | 0   | 13" x 24" x 34' (1)     | 430                   |

#### NOTES:

(1) ARMS OVER 20' TO BE TRUSS TYPE WITH  $\angle$  3" x 3" x  $\frac{3}{8}$ " ANGLES.

(2) MAX SIGN AREA ON EACH SIDE EQUALS HALF THE TOTAL IN CHART.

W = 40# PER SQUARE FOOT

| ESTIMATED QUANTITIES |             |             |                                 |             |             |             |                   |         |        |         |               |
|----------------------|-------------|-------------|---------------------------------|-------------|-------------|-------------|-------------------|---------|--------|---------|---------------|
| TYPE<br>NUMBER       | DIA.<br>"d" | DIA.<br>"b" | CLASS B CONCRETE FOOTING (C.Y.) |             |             |             | REINFORCING STEEL |         |        |         |               |
|                      |             |             | "d" SECTION                     |             | "b" SECTION |             | #5                |         | #4 (3) |         | TOTAL<br>LBS. |
|                      |             |             | 1'<br>DEPTH                     | 1"<br>DEPTH | 1'<br>DEPTH | 1"<br>DEPTH | NO.               | FT.-IN. | NO.    | FT.-IN. |               |
| B-2018               | 3'-6"       | 6'-0"       | 0.3563                          | 0.0297      | 0.6800      | 0.0567      | 6                 | 10'-0"  | 11     | 10'-4"  | 139           |
| B-23318              | 3'-6"       | 7'-0"       | 0.3563                          | 0.0297      | 0.8100      | 0.0675      | 6                 | 10'-6"  | 12     | 10'-4"  | 149           |
| B-20018              | 3'-6"       | 7'-0"       | 0.3563                          | 0.0297      | 0.8100      | 0.0675      | 6                 | 12'-0"  | 13     | 10'-4"  | 165           |

(3) ESTIMATED QUANTITY FOR REINFORCING STEEL IS BASED ON A 2:1 (H:V) SLOPE.

| MODIFIED FOOTING IN SOLID ROCK |                        |                        |                   |       |       | CLASS B CONCRETE FOOTING CU. YD. |          |
|--------------------------------|------------------------|------------------------|-------------------|-------|-------|----------------------------------|----------|
| TYPE NUMBER                    | ANCHOR BOLT (4) (DIA.) | ANCHOR BOLT PLATE      | FOOTING           |       |       | "b" SECTION                      |          |
|                                |                        |                        | "h <sup>2</sup> " | "d"   | "b"   | 1' DEPTH                         | 1" DEPTH |
| B-2018                         | 2 1/4"                 | 4 1/2" x 4 1/2" x 3/4" | 3'-6"             | 3'-6" | 3'-6" | 0.3563                           | 0.0297   |
| B-23318                        | 3"                     | 5 1/2" x 5 1/2" x 1"   | 4'-0"             | 3'-6" | 4'-6" | 0.4860                           | 0.0405   |
| B-20018                        | 3"                     | 5 1/2" x 5 1/2" x 1"   | 5'-0"             | 3'-6" | 4'-6" | 0.4860                           | 0.0405   |

(4) ANCHOR BOLT LENGTH AS REQUIRED

#### GENERAL NOTE:

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL C. OF THE TRUSS.

ALL ANCHOR BOLTS SHALL BE FULLY GALVANIZED HIGH STRENGTH ANCHOR BOLTS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



**NICOLE A. KOLB HOOD**  
NUMBER PE-2001018754  
PROFESSIONAL ENGINEER

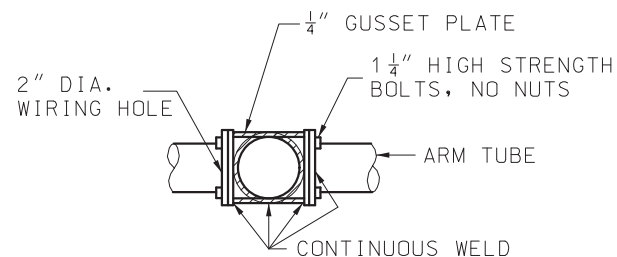
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

**HIGHWAY SIGNING**  
TUBULAR SUPPORT STEEL  
TYPE B

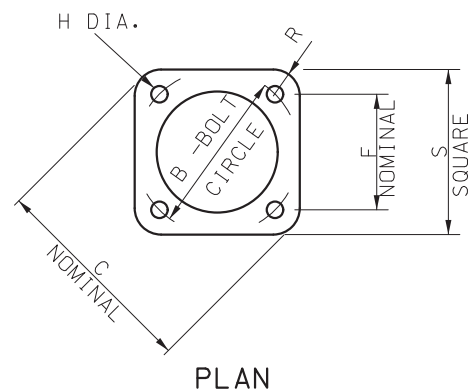
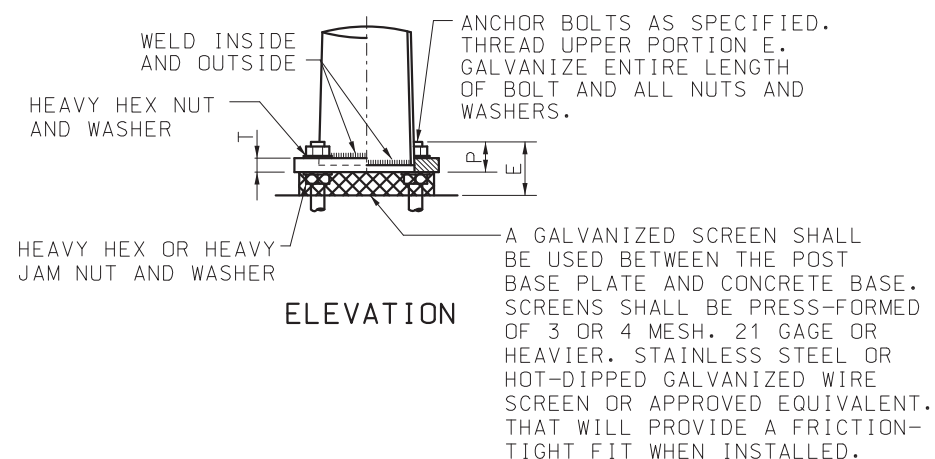
DATE EFFECTIVE: 10/01/2022  
DATE PREPARED: 7/19/2022

**903.08K**

SHEET NO.  
1 OF 2

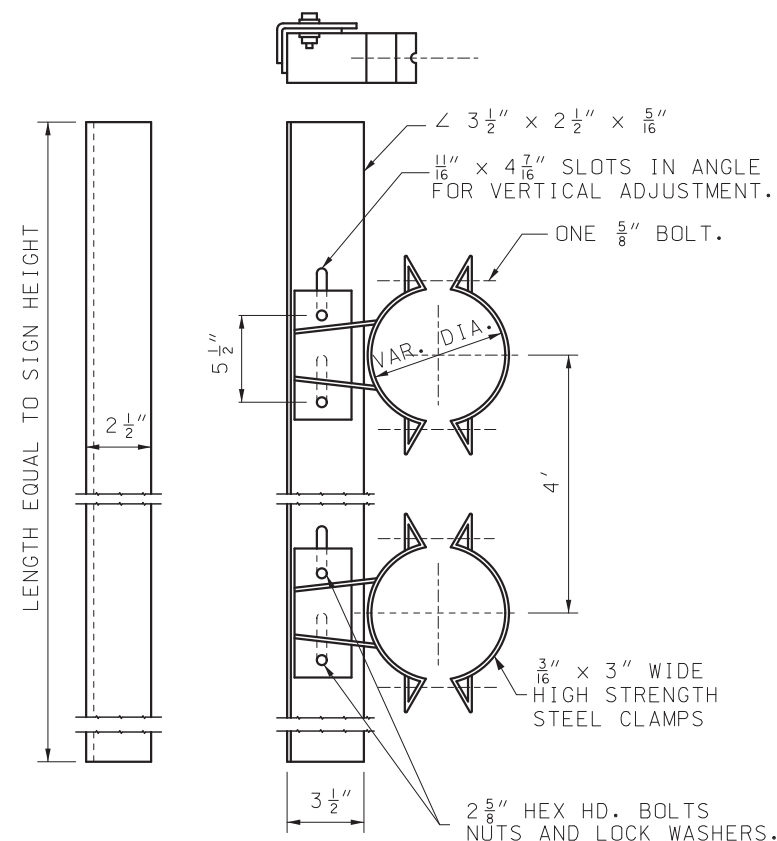


ARM ATTACHMENT DETAIL



DETAIL A  
POST BASE DETAIL

| POST BASE DIMENSIONS |         |     |     |        |         |        |        |        |        |                 |         |       |       |
|----------------------|---------|-----|-----|--------|---------|--------|--------|--------|--------|-----------------|---------|-------|-------|
| TYPE<br>NUMBER       | B       | C   | F   | H      | S       | R      | P      | T      | E      | ANCHOR<br>BOLTS | FOOTING |       |       |
|                      |         |     |     |        |         |        |        |        |        |                 | "h"     | "d"   | "b"   |
| B-2018               | 25 1/2" | 33" | 18" | 2 5/8" | 26 1/2" | 5 1/2" | 5 1/2" | 2 1/2" | 9 1/2" | 2 1/4" x 96"    | 7'-6"   | 3'-6" | 6'-0" |
| B-23318              | 25 1/2" | 33" | 18" | 3 3/8" | 26 1/2" | 5 1/2" | 7"     | 3"     | 12"    | 3" x 120"       | 8'-0"   | 3'-6" | 7'-0" |
| B-20018              | 25 1/2" | 33" | 18" | 3 3/8" | 26 1/2" | 5 1/2" | 7"     | 3"     | 12"    | 3" x 120"       | 9'-6"   | 3'-6" | 7'-0" |



GALVANIZED SIGN BRACKET ASSEMBLY \*

| SIGN HEIGHT INCHES | MAX. LIN. FT. OF SIGN WIDTH PER BRACKET |
|--------------------|-----------------------------------------|
| 48 & UNDER         | 16                                      |
| 60                 | 16                                      |
| 72                 | 15                                      |
| 84                 | 11                                      |
| 96                 | 6                                       |
| 108                | 4                                       |
| 120                | 3                                       |

\* MINIMUM OF TWO BRACKETS REQUIRED ON SIGNS OVER 42" IN LENGTH



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STATE OF MISSOURI  
NICOLE A. KOLB HOOD  
NUMBER  
PE-2001018754  
PROFESSIONAL ENGINEER

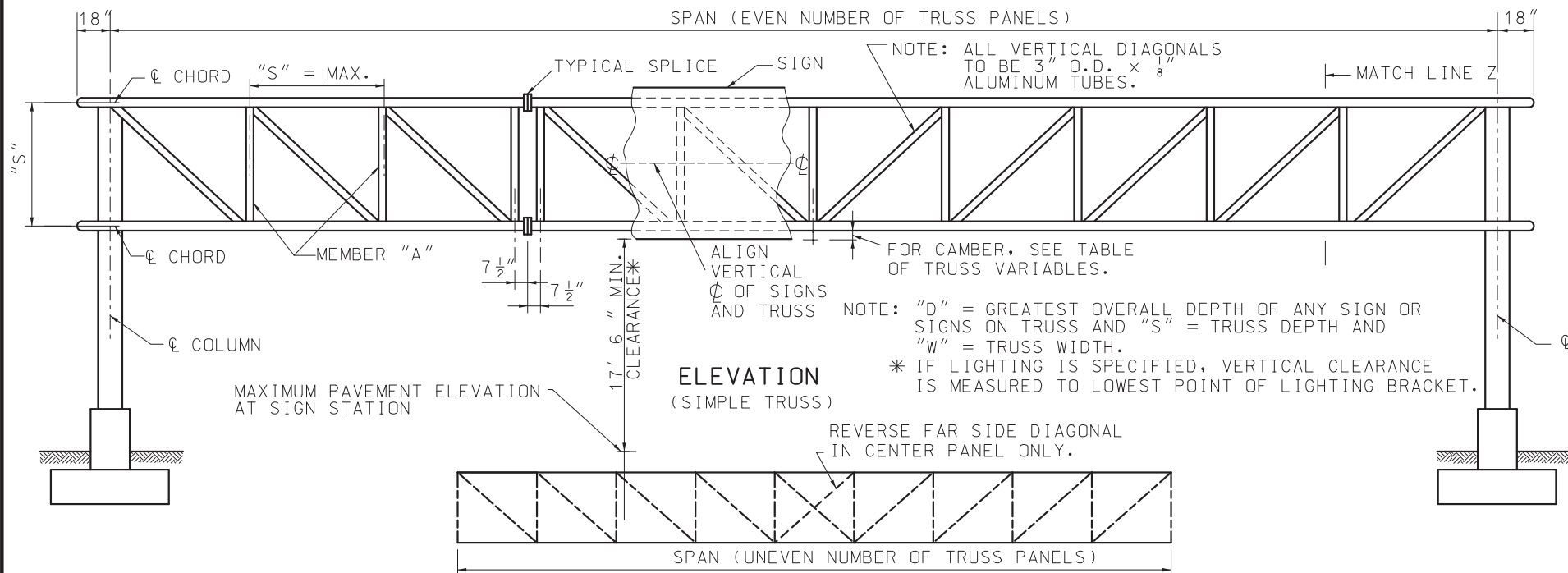
THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

HIGHWAY SIGNING  
TUBULAR SUPPORT STEEL  
TYPE B

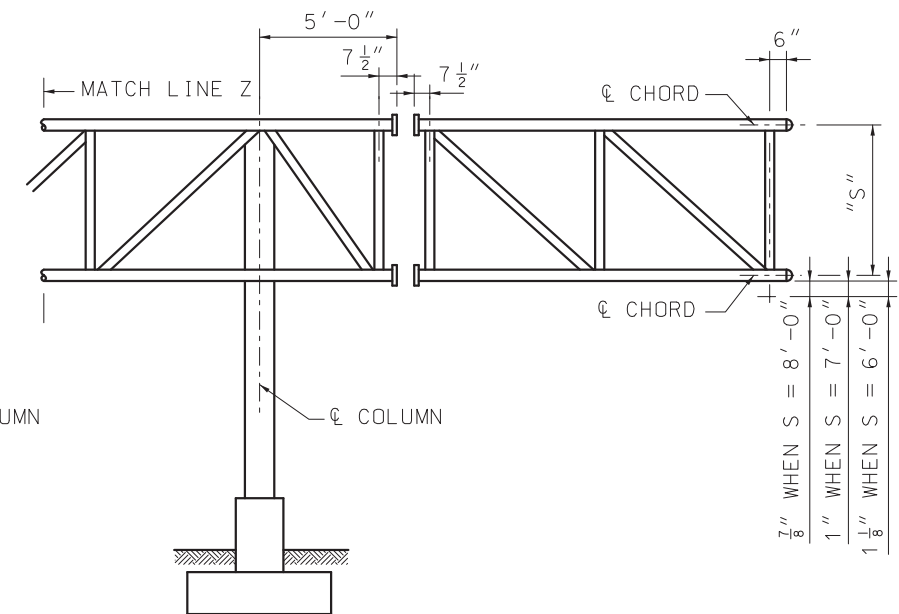
DATE EFFECTIVE: 10/01/2022  
DATE PREPARED: 7/19/2022

903.08K

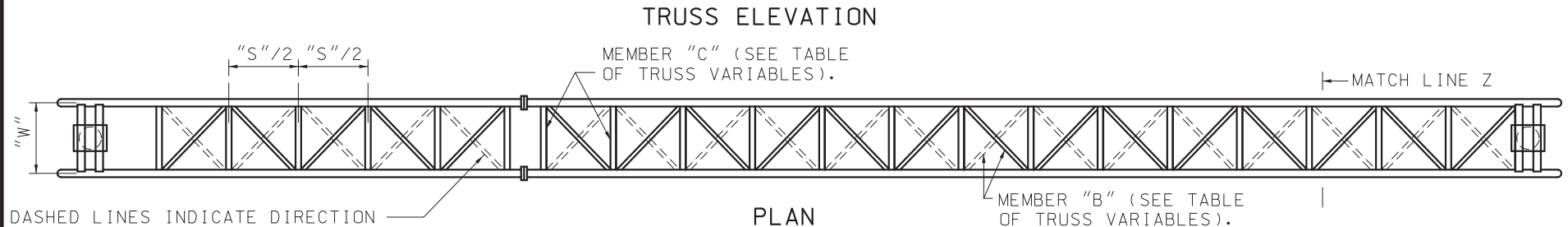
SHEET NO.  
2 OF 2



ELEVATION  
(SIMPLE TRUSS)

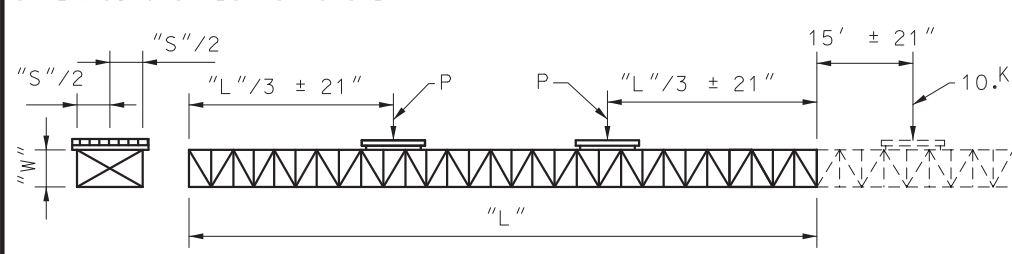


ELEVATION  
(SIMPLE TRUSS MODIFIED  
FOR CANTILEVER SPAN)



TRUSS ELEVATION

PLAN

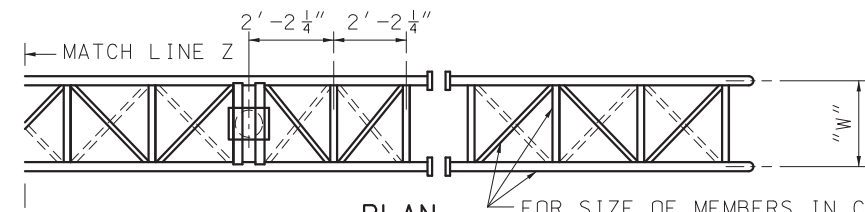


$$P = \frac{84\alpha W}{L} - 0.02 L$$
 WHERE  
P = CONCENTRATED LOAD IN KIPS.  
α = AREA OF ONE CHORD TUBE IN SQUARE INCHES.  
(USE 0.76α FOR 4" DIA. x 1/4" AND 4 1/2" DIA. x 1/4" CHORDS)  
W = WIDTH OF TRUSS IN FEET.  
L = SPAN LENGTH IN FEET.

SAMPLE, GIVEN: α = 4.123 SQ. IN., W = 6'-0" AND L = 100'.  
SOLUTION:  $P = \frac{84 \times 4.123 \times 6.0}{100} - 0.02 \times 100 = 20.8 - 2 = 18.8$

NOTE:  
IF CANTILEVERED, REMOVE CONCENTRATED LOAD NEAREST CANTILEVER END AND LOAD CANTILEVER SPAN AS SHOWN ABOVE.  
15' OR LESS CANTILEVER SPANS NEED NOT BE TESTED.  
REPEAT ABOVE TESTS BY ROTATING 180° (TO SIMULATE WIND REVERSAL). NO VERTICAL LOAD (D.L.) TEST WILL BE REQUIRED.  
LOADS P SHALL NOT BE MORE THAN 16° FOR SPANS LESS THAN 55 FEET AND 20°. FOR ALL OTHERS.

### SIMULATED WIND-SHOP TEST LOADING



PLAN

FOR SIZE OF MEMBERS IN CANTILEVER SPAN SEE SHEET NO. 2 OF 8.

| TRUSS VARIABLES |       |       |                    |                    |                    |             |
|-----------------|-------|-------|--------------------|--------------------|--------------------|-------------|
| SPAN            | "S"   | "W"   | MEMBER "A"         | MEMBER "B"         | MEMBER "C"         | SHOP CAMBER |
| UP TO 70'-6"    | 6'-0" | 5'-0" | 2 1/2" DIA. x 1/8" | 2 1/2" DIA. x 1/8" | 1 3/4" DIA. x 1/8" | 3/4"        |
| 71' TO 80'-6"   | 6'-0" | 6'-0" | 2 1/2" DIA. x 1/8" | 2 1/2" DIA. x 1/8" | 2" DIA. x 1/8"     | 1 1/4"      |
| 81' TO 90'-6"   | 6'-0" | 6'-0" | 2 1/2" DIA. x 1/8" | 2 3/4" DIA. x 1/8" | 2" DIA. x 1/8"     | 1 1/2"      |
| 91' TO 100'-6"  | 6'-0" | 6'-0" | 2 1/2" DIA. x 1/8" | 2 3/4" DIA. x 1/8" | 2" DIA. x 1/8"     | 2 1/4"      |
| 101' TO 110'-6" | 7'-0" | 7'-0" | 2 1/2" DIA. x 1/8" | 3" DIA. x 1/8"     | 2 1/4" DIA. x 1/8" | 2 1/2"      |
| 111' TO 120'-6" | 7'-0" | 7'-0" | 2 1/2" DIA. x 1/8" | 3 1/2" DIA. x 1/8" | 2 1/4" DIA. x 1/8" | 2 3/4"      |
| 121' TO 130'-6" | 7'-0" | 7'-0" | 3" DIA. x 1/8"     | 3 1/2" DIA. x 1/8" | 2 1/4" DIA. x 1/8" | 3 3/4"      |
| 131' TO 140'-6" | 8'-0" | 7'-0" | 3" DIA. x 1/8"     | 3 3/4" DIA. x 1/8" | 2 1/2" DIA. x 1/8" | 3"          |
| 141' TO 150'-6" | 8'-0" | 7'-0" | 3" DIA. x 1/8"     | 3 3/4" DIA. x 1/8" | 2 3/4" DIA. x 1/8" | 3 3/4"      |
| 151' TO 160'-6" | 8'-0" | 7'-0" | 3" DIA. x 1/8"     | 3 3/4" DIA. x 1/8" | 2 3/4" DIA. x 1/8" | 4 1/2"      |

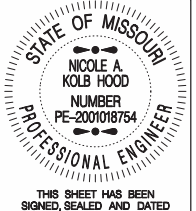
NOTE:  
FOR SIZE OF CHORD MEMBERS, SEE DATA SHEET. SHOP CAMBER MAY BE PARABOLIC OR STRAIGHT, BUT SHALL BE SYMMETRICAL ABOUT CENTERLINE OF SPAN.

- GENERAL NOTES:
- ALL STRUCTURAL STEEL AND COLUMN BASE PLATES ASTM A36.
  - ALL ANCHOR BOLTS SHALL BE ASTM F1554, GRADE 36.
  - PROPOSED FIELD SPLICES SHALL BE SHOWN ON SHOP DRAWINGS FOR APPROVAL OF THE ENGINEER.
  - TRUSSES SHALL BE FABRICATED WITH A MINIMUM OF SPLICING IN TRUSS CHORDS.
  - FIELD SPLICING WILL NOT BE PERMITTED WITHIN THE MIDDLE ONE-THIRD OF SPAN.
  - PERMISSIBLE VENT HOLES (MAXIMUM 1/8" DIAMETER) SHALL BE PLACED A MINIMUM OF 3" FROM WELD ON LOW SIDE OF HORIZONTAL, VERTICAL AND DIAGONAL TUBES.
  - ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL C OF THE TRUSS.
  - FOR ADDITIONAL INFORMATION SEE DATA SHEET.



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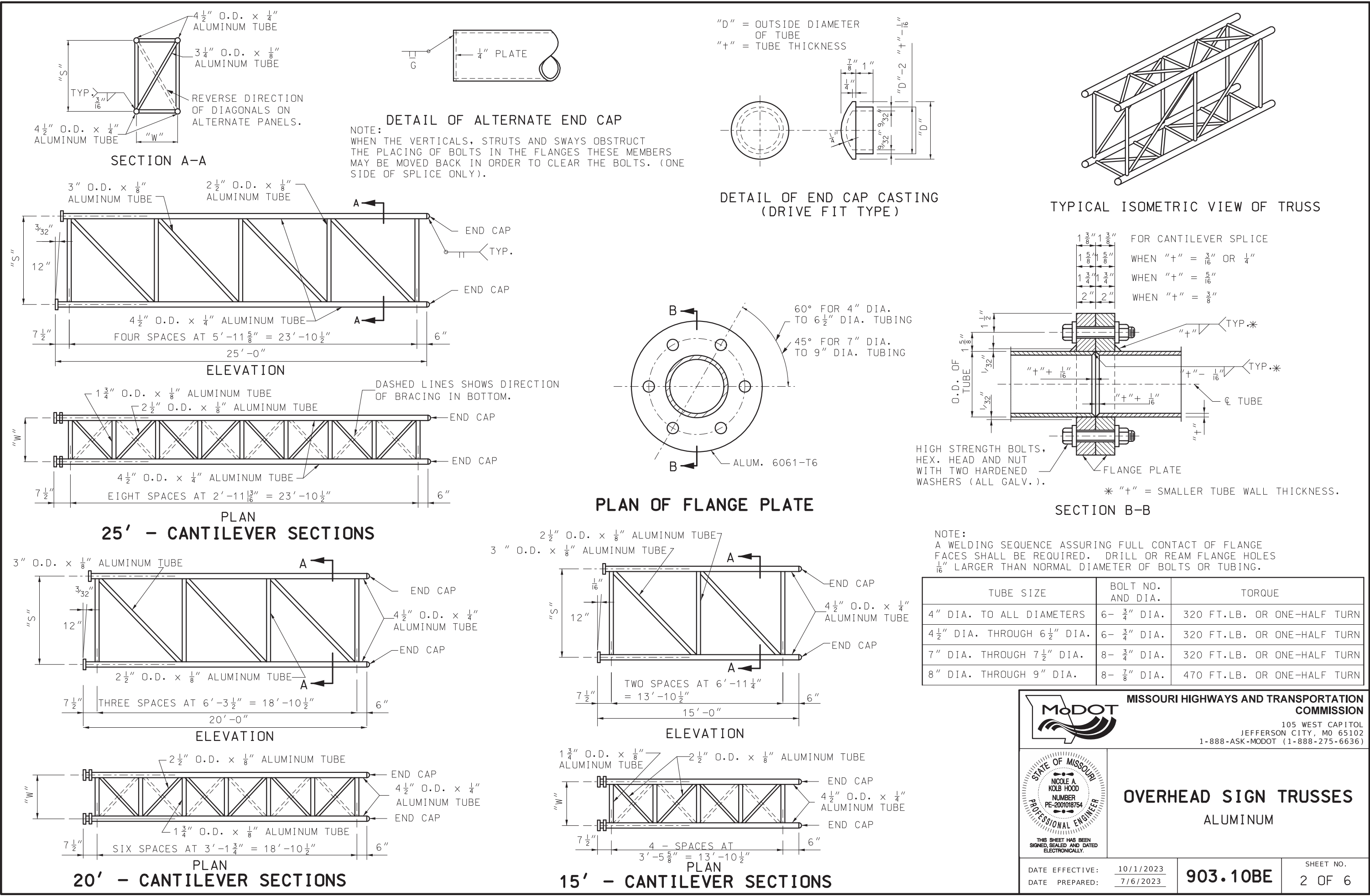


OVERHEAD SIGN TRUSSES

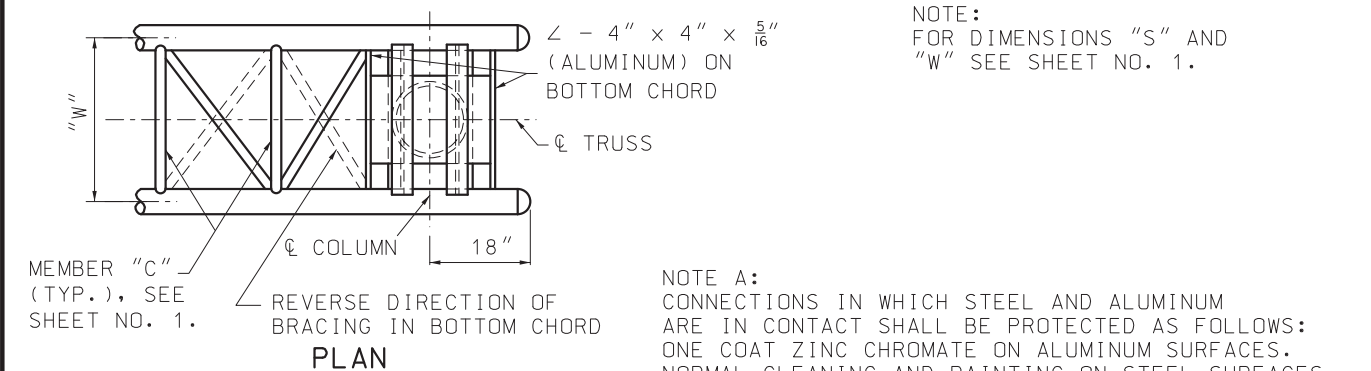
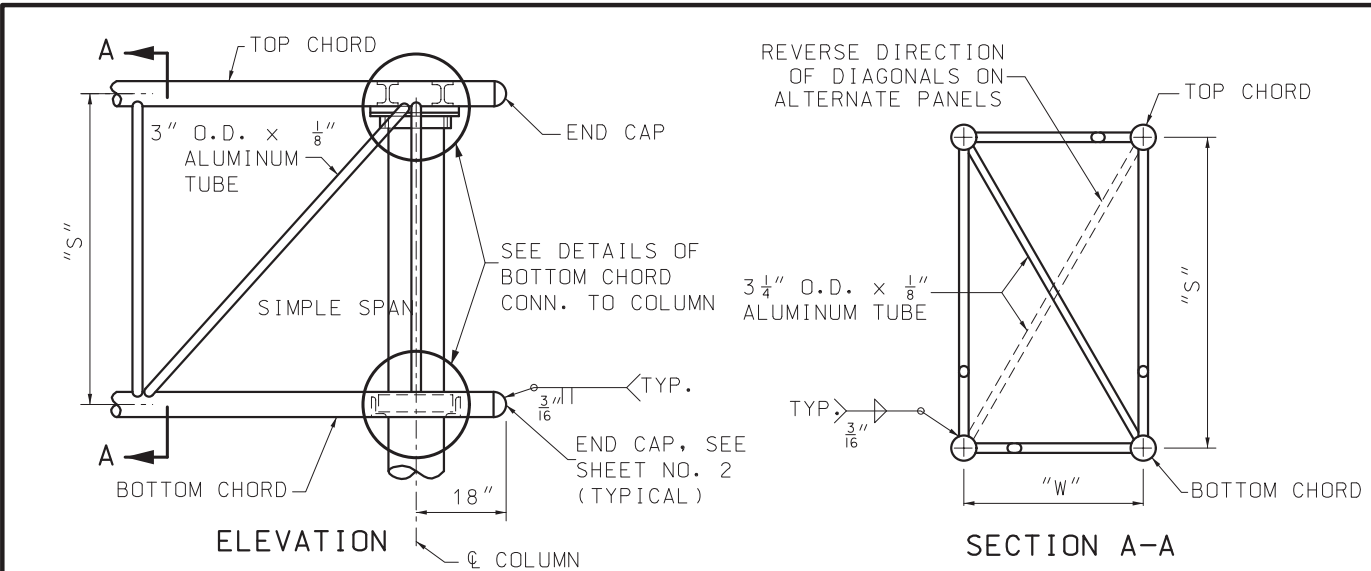
ALUMINUM

|                 |           |          |                     |
|-----------------|-----------|----------|---------------------|
| DATE EFFECTIVE: | 10/1/2023 | 903.10BE | SHEET NO.<br>1 OF 6 |
| DATE PREPARED:  | 7/6/2023  |          |                     |

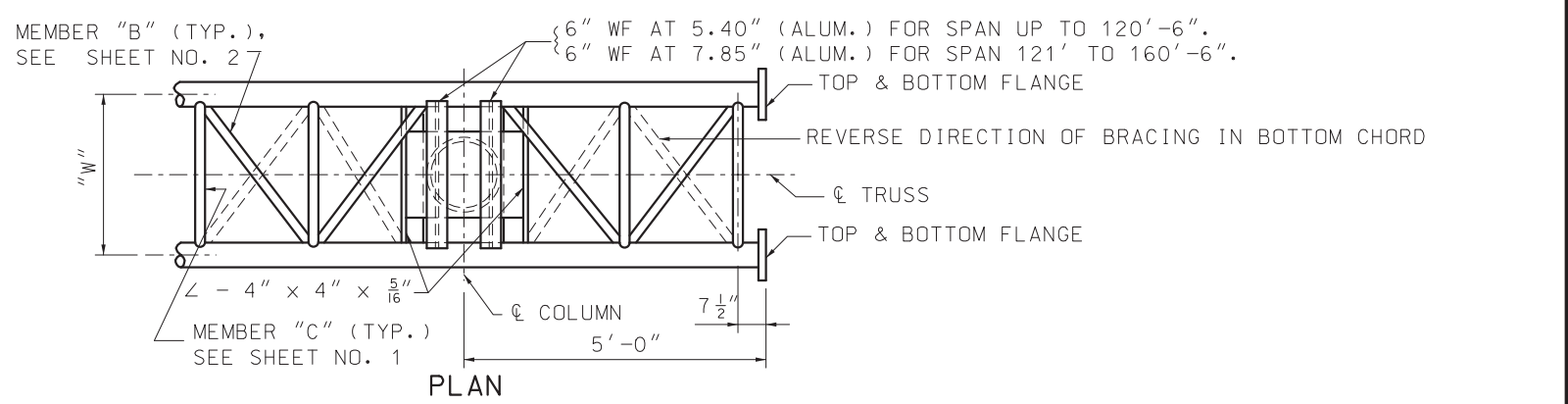
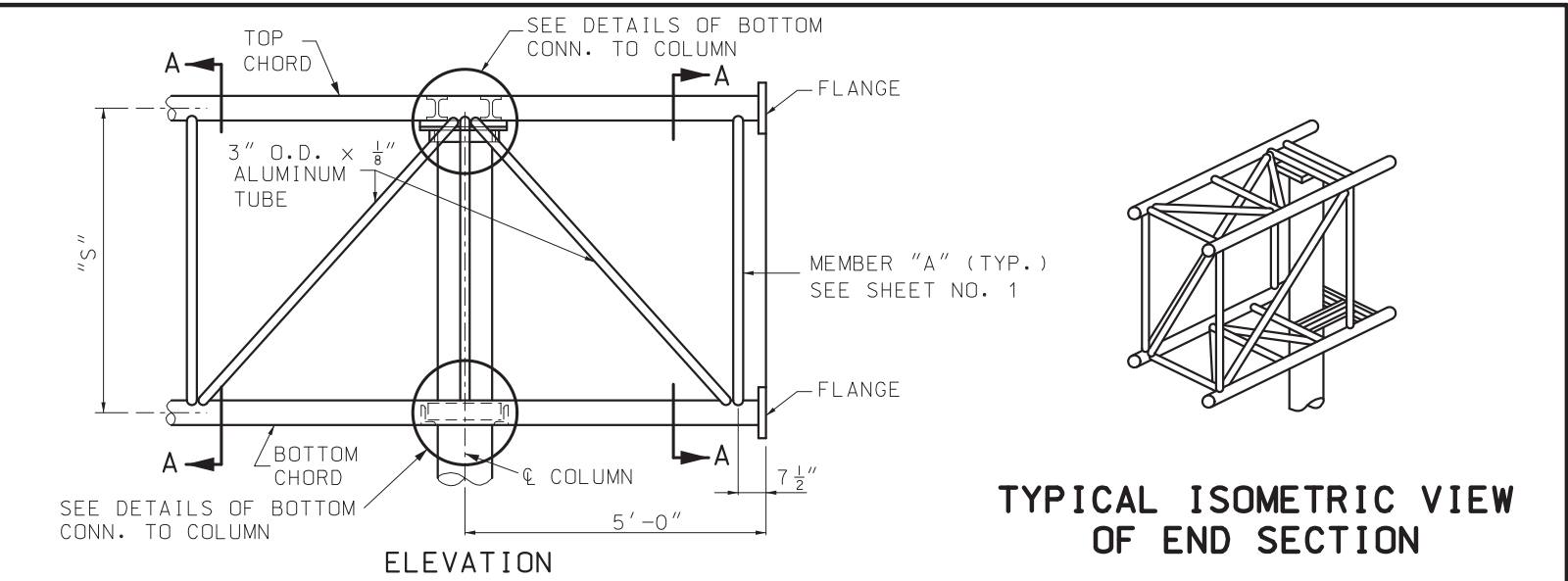
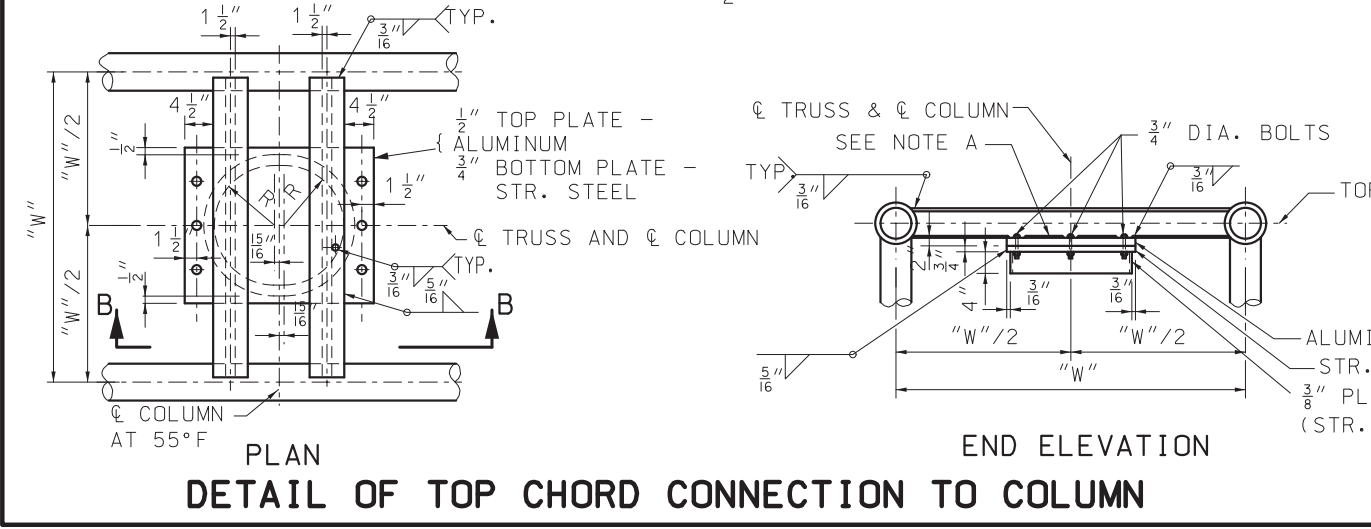
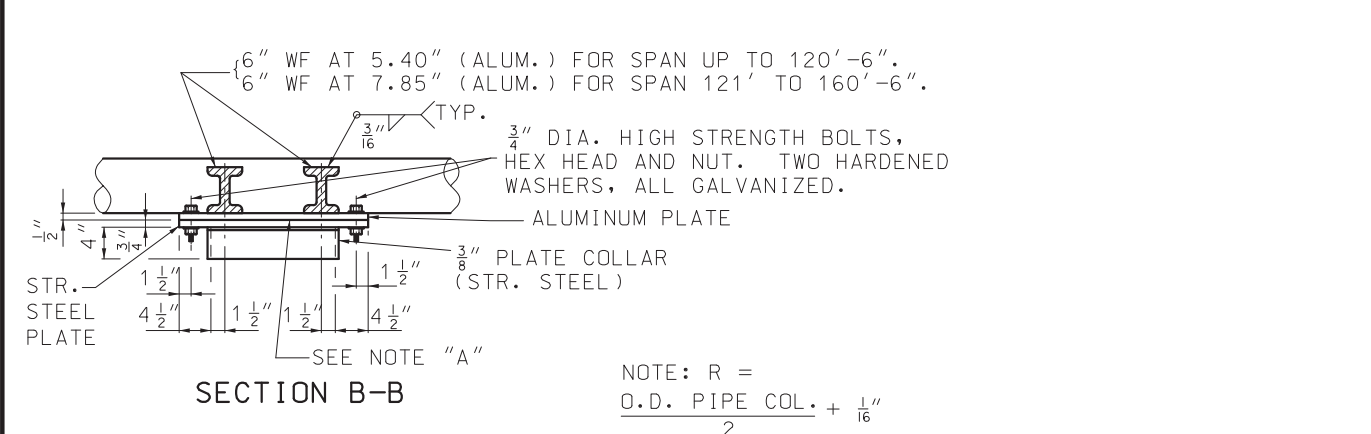




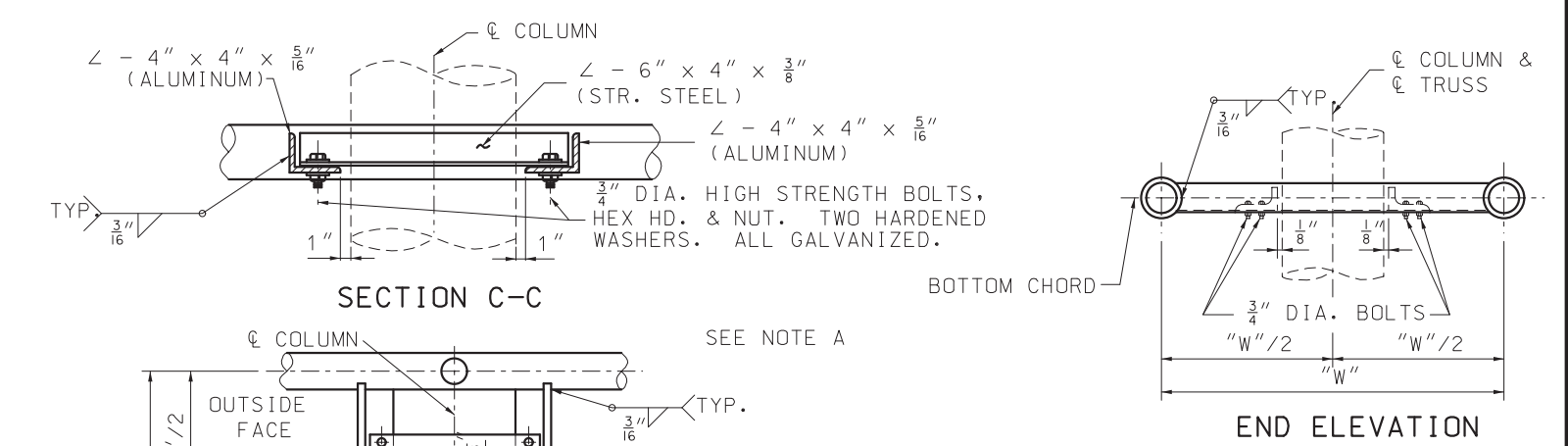
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



# TRUSS END WITHOUT CANTILEVER



# TRUSS END MODIFIED FOR CANTILEVER



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1-888-ASK-MODOT (1-888-275-6636)

OVERHEAD SIGN TRUSSES

ALUMINUM

|                 |           |          |                     |
|-----------------|-----------|----------|---------------------|
| DATE EFFECTIVE: | 10/1/2023 | 903.10BE | SHEET NO.<br>3 OF 6 |
| DATE PREPARED:  | 7/6/2023  |          |                     |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.







(TO BE USED ADJACENT TO TYPE "A" OR "C" MEDIAN BARRIER)

NOTE:  
THE 2" CONDUIT IN THE CONCRETE PEDESTAL SHALL  
BE PVC SCHEDULE 40 AND SHALL BE PLACED WITH A  
MIN. RADIUS BEND OF 9½".



| POST<br>TYPE | PIPE<br>COLUMN     | PEDESTAL<br>SIZE * |        | FOOTING<br>SIZE * | LONGITUDINAL<br>FOOTING<br>REINFORCEMENT |              | CONCRETE<br>C.Y.            |                             |
|--------------|--------------------|--------------------|--------|-------------------|------------------------------------------|--------------|-----------------------------|-----------------------------|
|              |                    | c                  | d      |                   | TOP                                      | BOTTOM       | TYPE A<br>MEDIAN<br>BARRIER | TYPE C<br>MEDIAN<br>BARRIER |
| I            | 12" STD. AT 65.42  | 5'-9"              | 2'-1"  | 7'-0" x 14'-6"    | 7 - #5 BARS                              | 7 - #6 BARS  | 10.9                        | 11.6                        |
| II           | 14" O.D. AT 72.09  | 6'-2"              | 2'-2"  | 8'-0" x 16'-0"    | 8 - #5 BARS                              | 9 - #6 BARS  | 13.2                        | 14.0                        |
| III          | 16" O.D. AT 82.77  | 6'-7"              | 2'-4"  | 8'-6" x 17'-6"    | 9 - #5 BARS                              | 9 - #7 BARS  | 15.2                        | 16.1                        |
| IV           | 18" O.D. AT 93.45  | 7'-1"              | 2'-6"  | 9'-6" x 19'-0"    | 10 - #5 BARS                             | 10 - #8 BARS | 18.1                        | 19.1                        |
| V            | 20" O.D. AT 104.13 | 7'-8"              | 2'-11" | 10'-0" x 20'-0"   | 10 - #5 BARS                             | 10 - #8 BARS | 20.6                        | 21.7                        |
| VI           | 24" O.D. AT 125.49 | 8'-3"              | 3'-5"  | 10'-6" x 21'-0"   | 11 - #5 BARS                             | 11 - #8 BARS | 23.3                        | 24.6                        |
| VII          | 24" O.D. AT 125.49 | 8'-6"              | 3'-5"  | 11'-0" x 22'-0"   | 11 - #5 BARS                             | 11 - #9 BARS | 25.1                        | 26.5                        |

\* BASE PLATES, PEDESTAL, AND FOOTINGS LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.

GENERAL NOTES:

A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B"  
SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC  
RESISTANCE WELDED STEEL PIPE; A.S.T.M. SPECIFICATION  
A53.

NO OBJECTIONABLE SEAMS WILL BE PERMITTED.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

PIPE COLUMN, BASE PLATE, ANCHOR BOLTS AND NOTES  
PERTAINING TO THESE ITEMS HAVE BEEN OMITTED  
FOR CLARITY. REFER TO SHEET NO. 4 OF 6 FOR DETAILS OF  
THESE ITEMS.

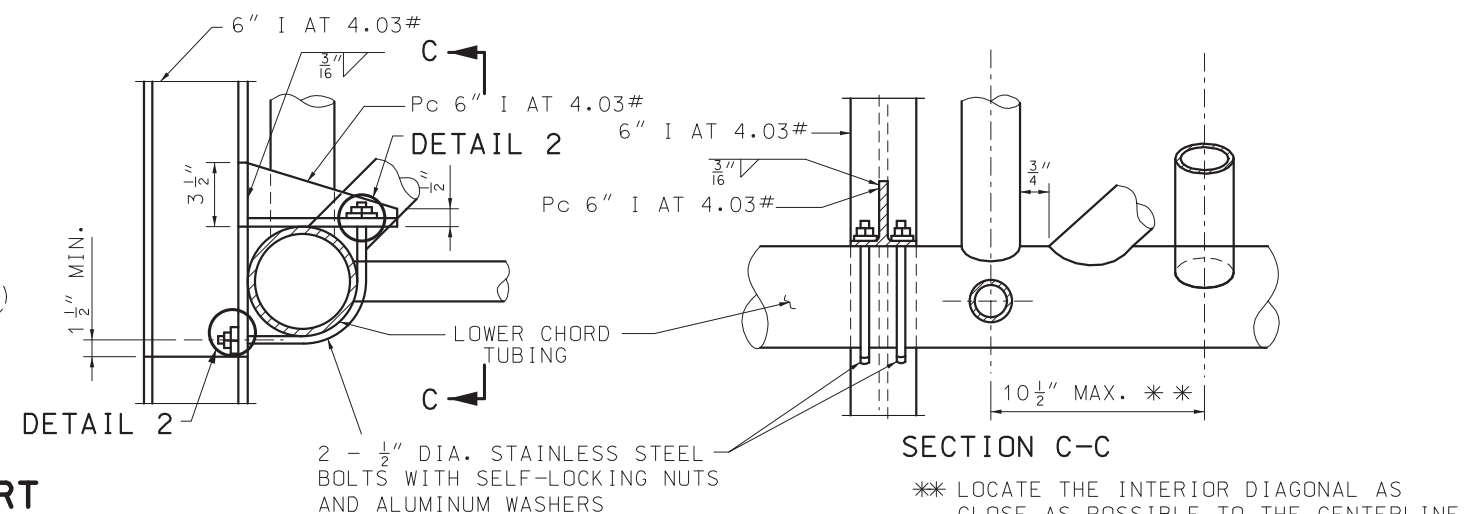
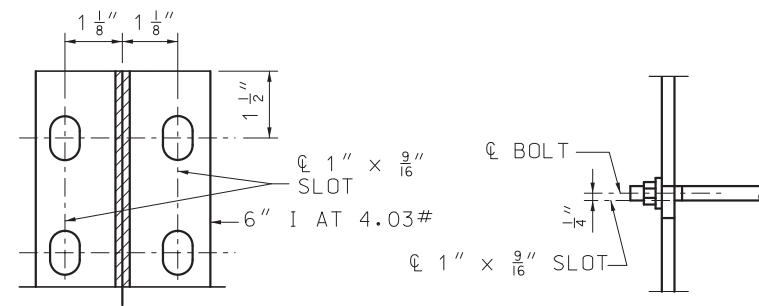
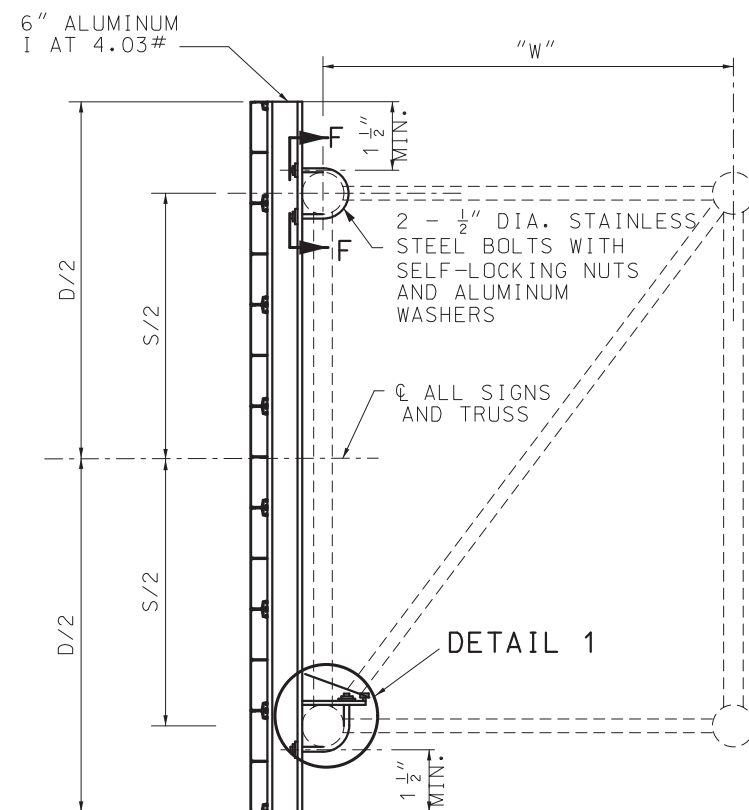
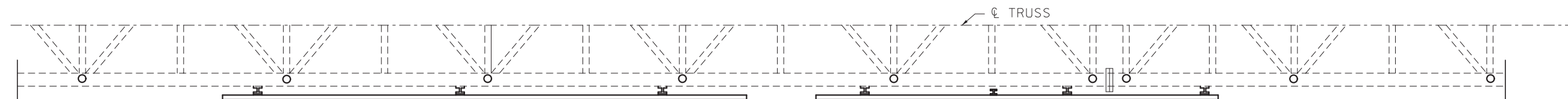
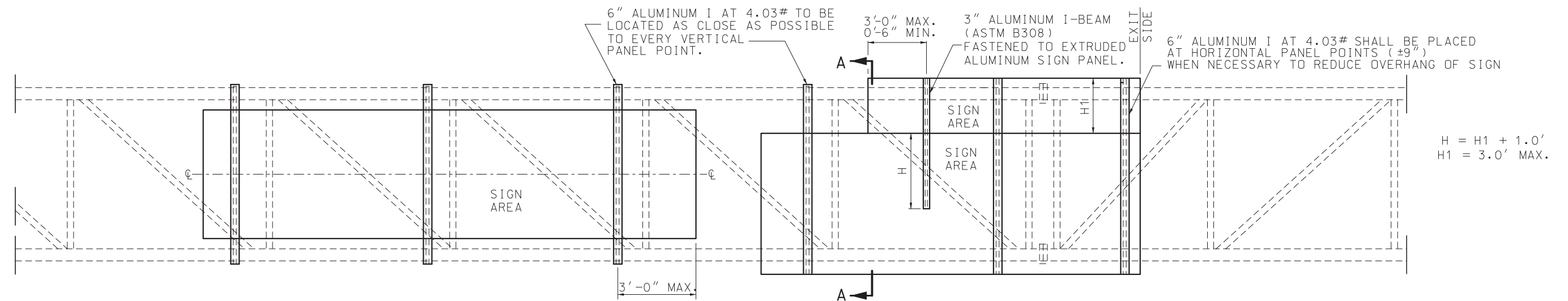
GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

QUANTITIES FOR PEDESTAL, BASED ON NOMINAL HEIGHT OF  
5'-2" (TYPE A MEDIAN BARRIER) OR 6'-0" (TYPE C  
MEDIAN BARRIER).

QUANTITIES FOR FOOTING, BASED ON NOMINAL DEPTH OF  
2'-0".

QUANTITIES SHOWN ARE FOR ONE COLUMN ONLY.

|                                                                                                                                                                                  |                                                                                                                                                                                          |  |                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------|
|                                                                                             | <p align="center"><b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b></p> <p align="right">105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |  |                                                   |
|  <p align="center">THIS SHEET HAS BEEN<br/>SIGNED, SEALED AND DATED<br/>ELECTRONICALLY.</p> | <p align="center"><b>OVERHEAD SIGN TRUSSES</b></p> <p align="center">ALUMINUM</p>                                                                                                        |  |                                                   |
| <p>DATE EFFECTIVE: <u>10/1/2023</u></p> <p>DATE PREPARED: <u>7/6/2023</u></p>                                                                                                    | <p align="center"><b>903.10BE</b></p>                                                                                                                                                    |  | <p align="center">SHEET NO.<br/><b>5 OF 6</b></p> |



GENERAL NOTES:

EXIT NO. PANELS SHALL BE MOUNTED FLUSH WITH THE EXIT  
SIDE OF THE GUIDE SIGN.

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE  
HORIZONTAL C OF THE TRUSS.

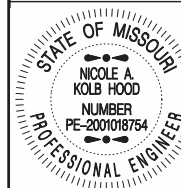
SEE STD. PLAN 903.09 FOR LIGHTING DETAILS IF  
LIGHTING THE SIGN IS NECESSARY.

SEE STD. PLAN 903.03 FOR SIGN MOUNTING DETAILS.

ALL MATERIAL ALUMINUM EXCEPT AS NOTED.

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)



## OVERHEAD SIGN TRUSSES

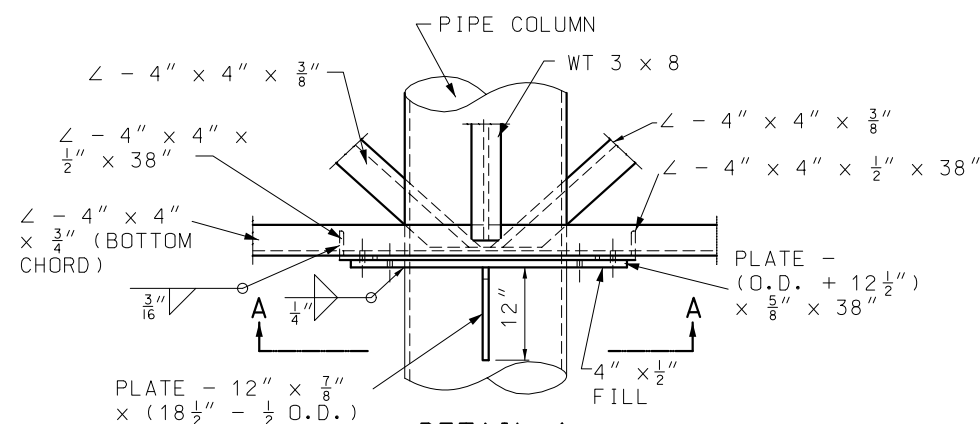
### SIGN MOUNTING DETAIL

DATE EFFECTIVE: 10/1/2023  
DATE PREPARED: 7/6/2023

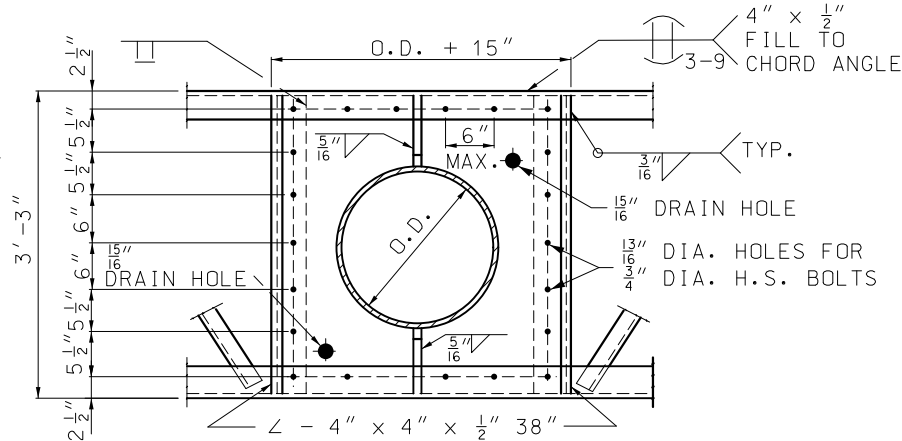
903.10BE

SHEET NO.  
6 OF 6

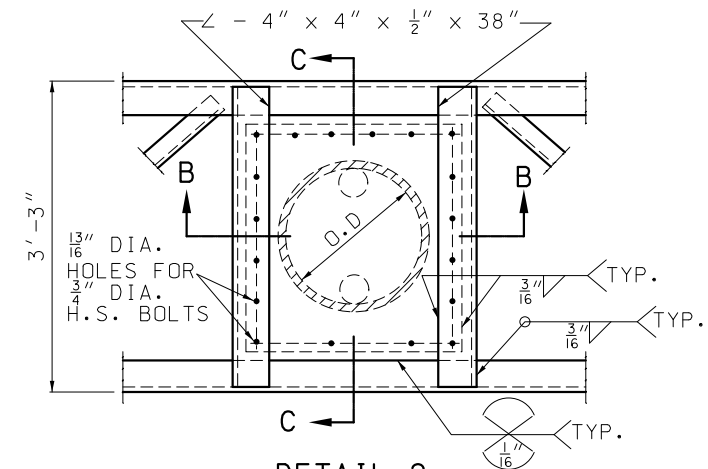
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



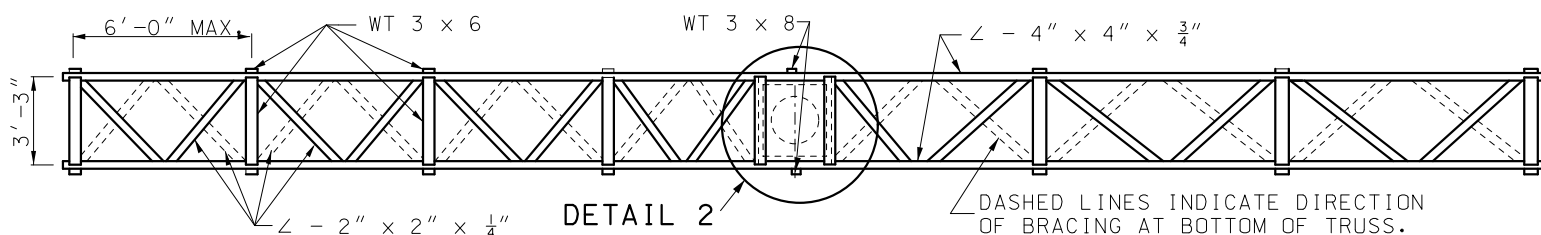
DETAIL 1  
TRUSS BOTTOM CONNECTION TO COLUMN



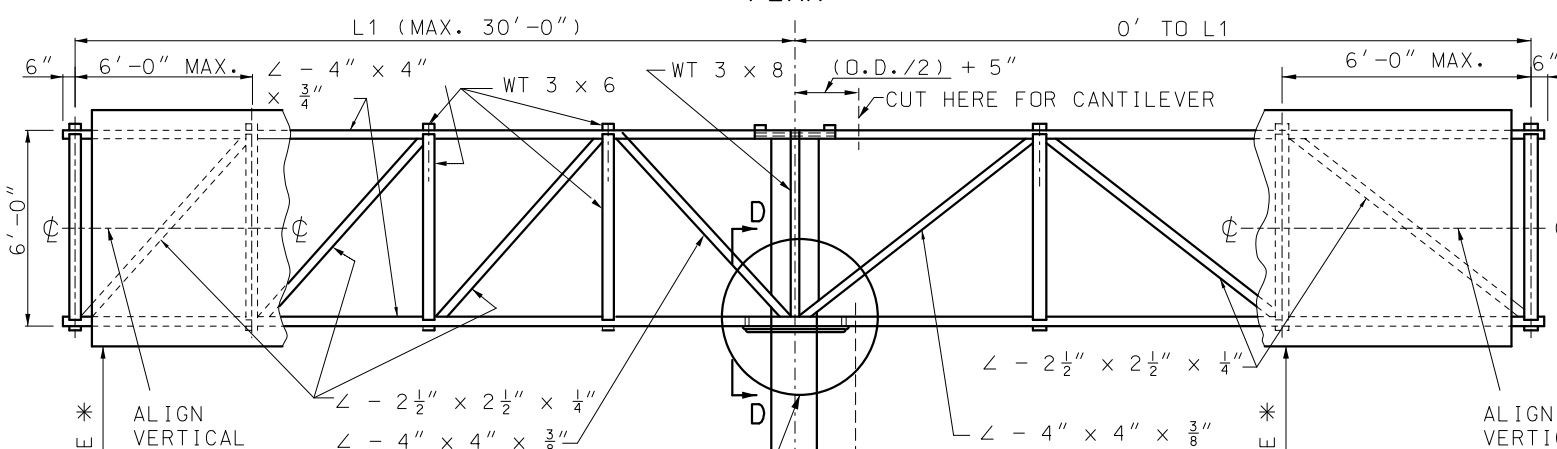
SECTION A-A



DETAIL 2  
TRUSS TOP CONNECTION TO COLUMN

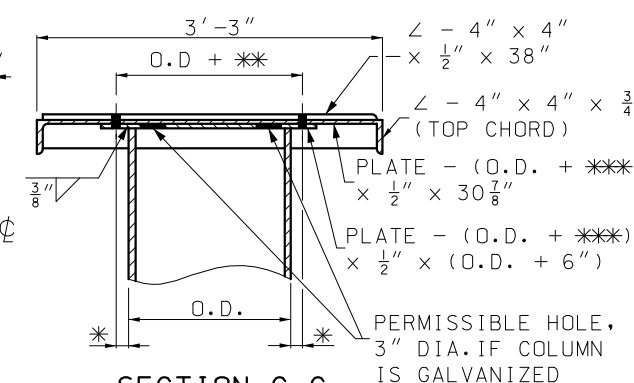


DETAIL 2  
PLAN

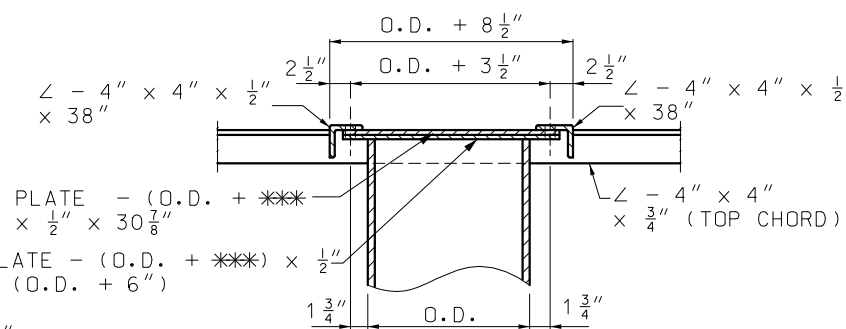


DETAIL 1

- \* 1 1/2" FOR POST TYPE VII  
1 3/4" FOR ALL OTHER POST TYPES
- \*\* 3" FOR POST TYPE VII  
3 1/2" FOR ALL OTHER POST TYPES
- \*\*\* 5 1/2" FOR POST TYPE VII  
6" FOR ALL OTHER POST TYPES



SECTION C-C



SECTION B-B

GENERAL NOTES:

ALL FASTENERS SHALL HAVE A HARDENED WASHER UNDER THE NUT OR BOLT HEAD, WHICHEVER IS TURNED IN TIGHTENING.

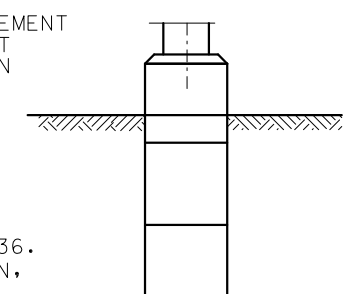
ZINC CHROMATE PRIMER SHALL MEET THE REQUIREMENTS OF FEDERAL SPECIFICATION TT-P-645 OR TT-P-1757 AND SHALL BE ACCEPTED ON THE BASIS OF THE LABEL SHOWING CONFORMANCE OR A MANUFACTURER'S CERTIFICATION.

DESIGN OF STRUCTURAL SUPPORTS SHALL COMPLY WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS 2001 AND CURRENT INTERIMS.

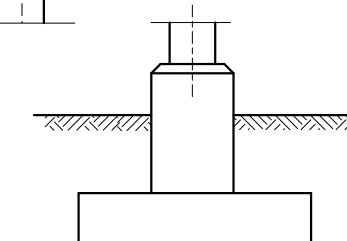
DESIGN OF SPREAD FOOTINGS SHALL COMPLY WITH 1994 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS.

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL  $\phi$  OF THE TRUSS.

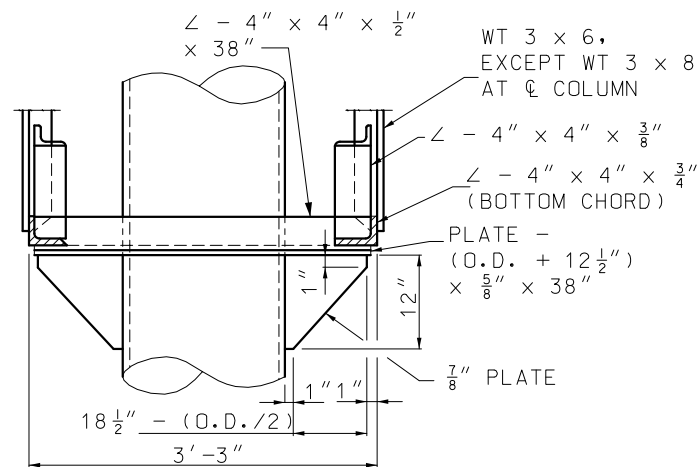
NOTE:  
TRUSSES AND COLUMN BASE PLATES: ASTM A36, ANCHOR BOLTS: ASTM F1554, GRADE 36. FOR ADDITIONAL INFORMATION, SEE DATA SHEET.



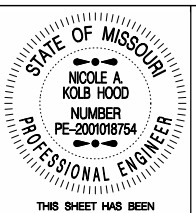
ELEVATION  
DRILLED SHAFT OPTION



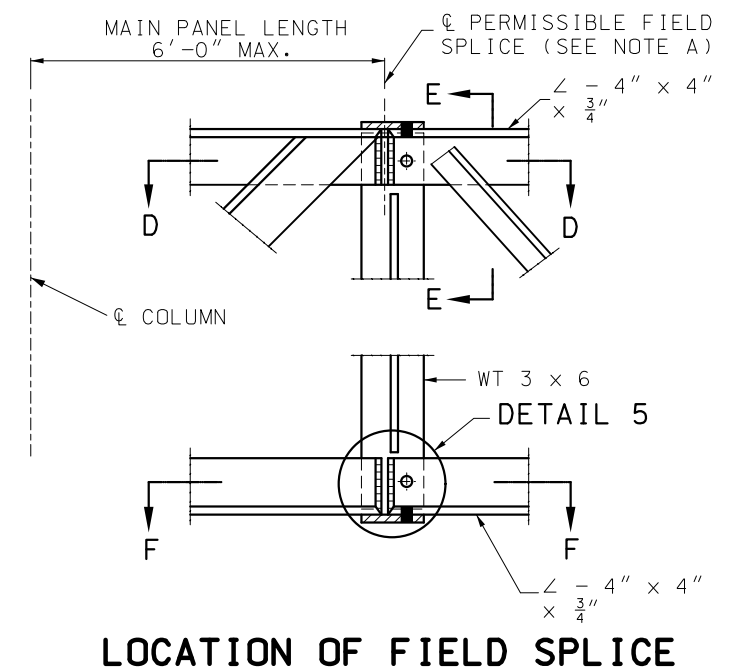
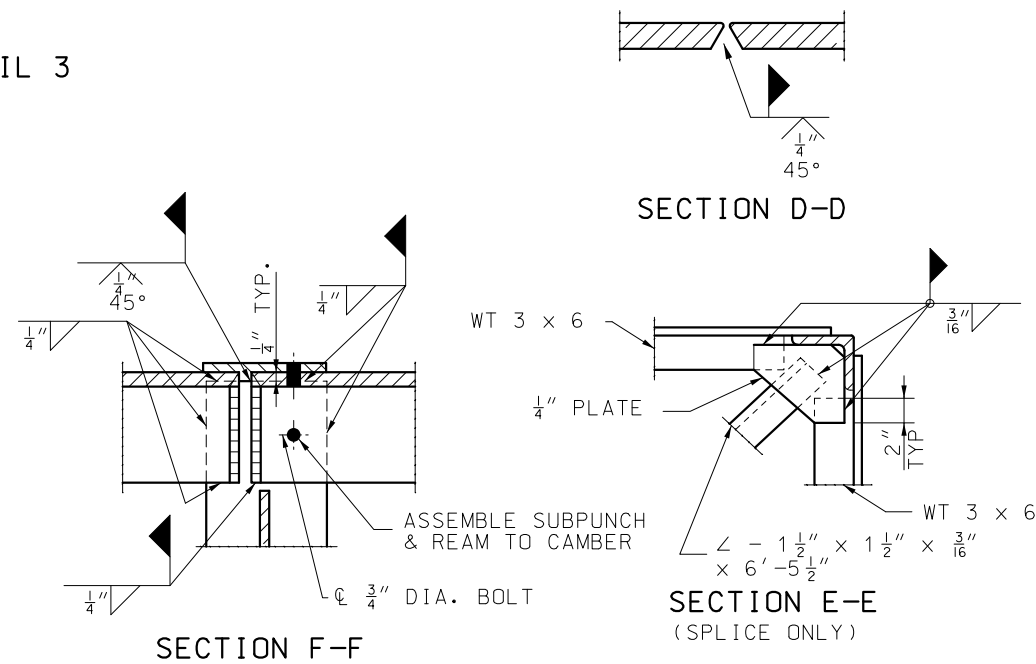
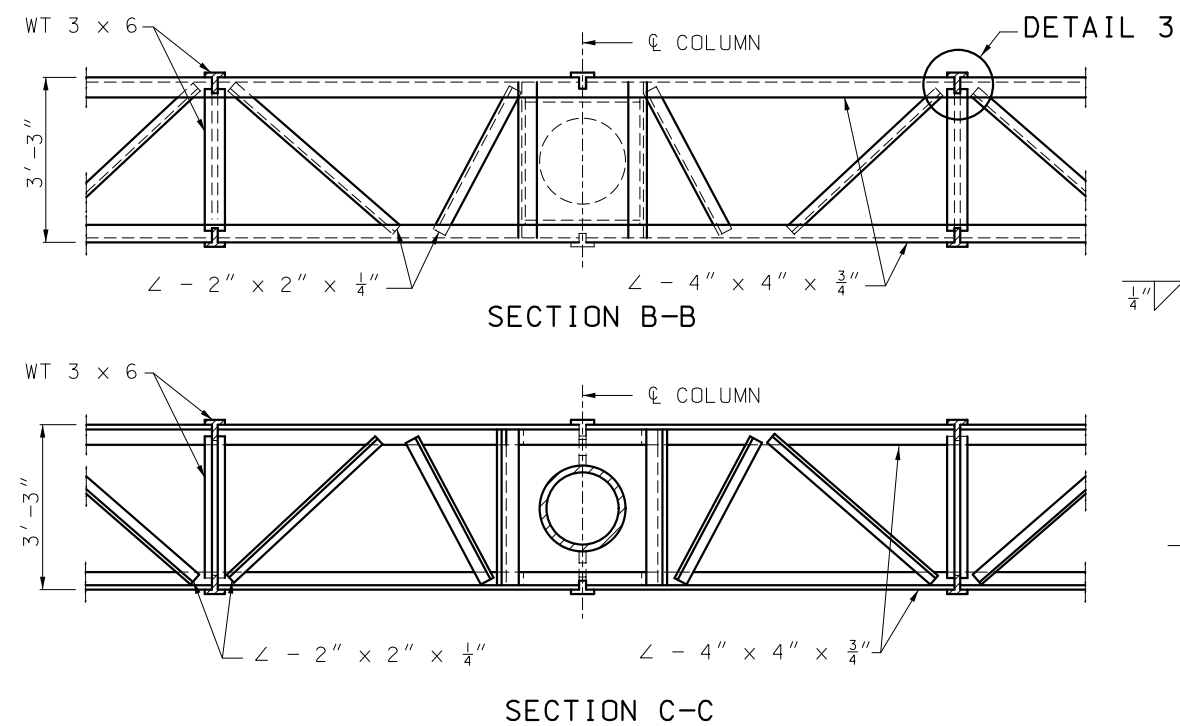
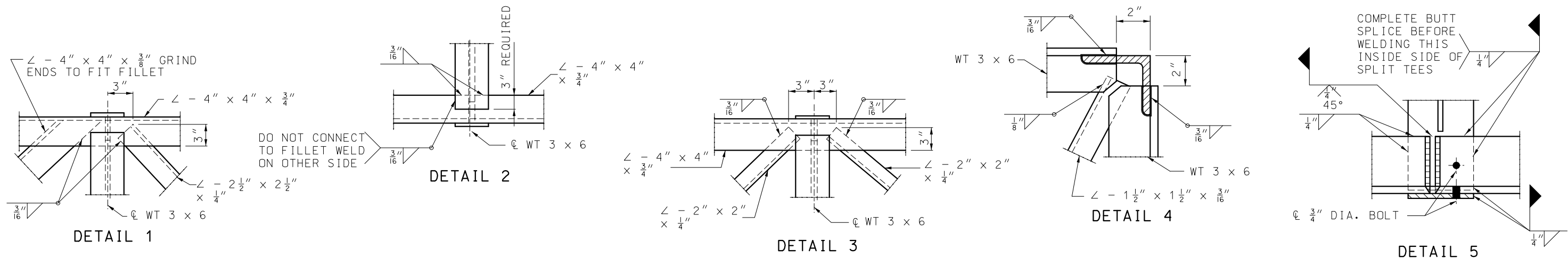
ELEVATION  
SPREAD FOOTING OPTION



SECTION D-D

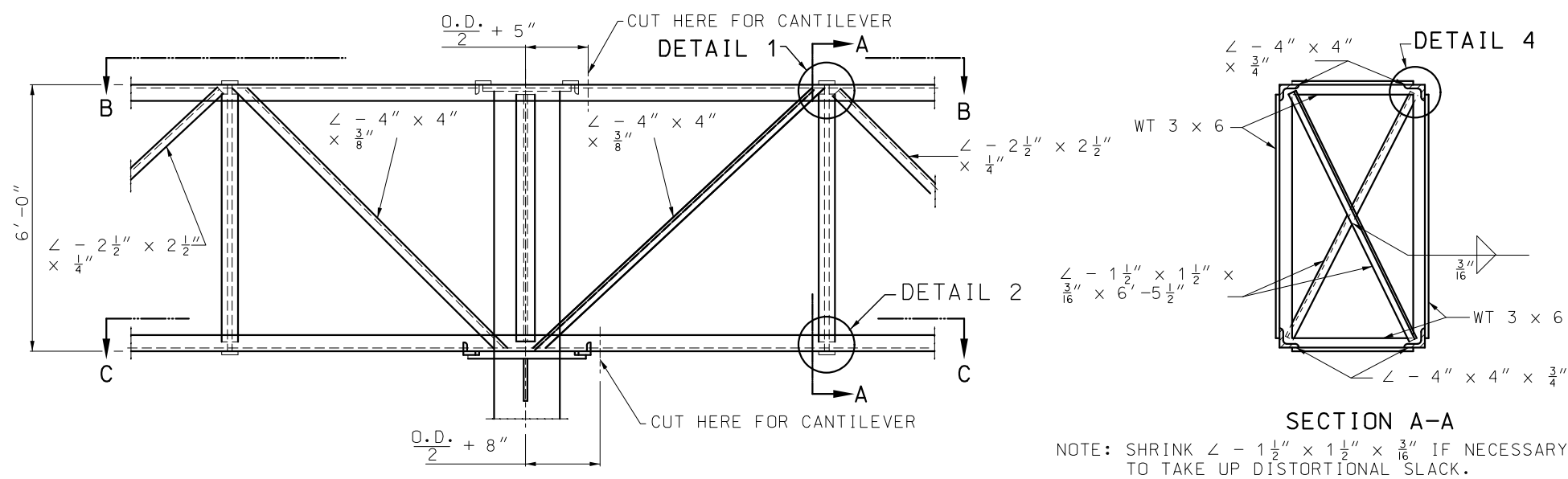
|                                                                                                                                                                                                                                  |                                                                              |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                              |                     |
|                                                                                                                                             | <b>OVERHEAD SIGN TRUSSES</b><br>BUTTERFLY AND CANTILEVER<br>STRUCTURAL STEEL |                     |
| DATE EFFECTIVE: 01-01-2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                          | <b>903.12AA</b>                                                              | SHEET NO.<br>1 OF 7 |





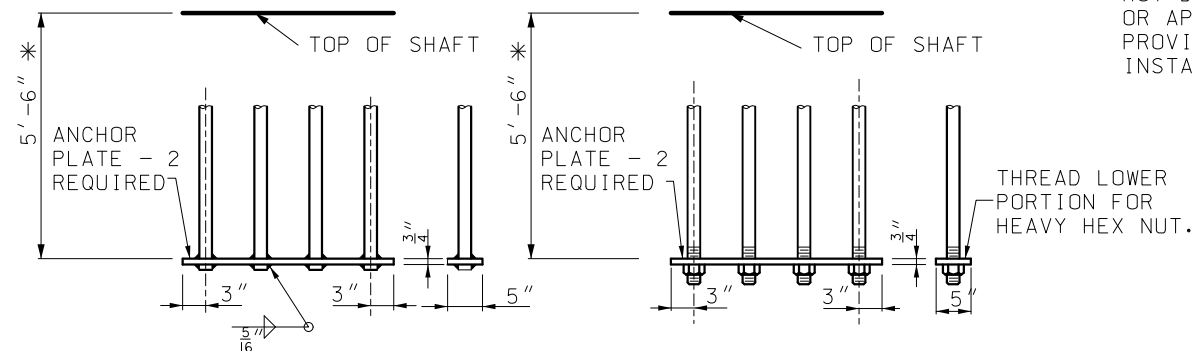
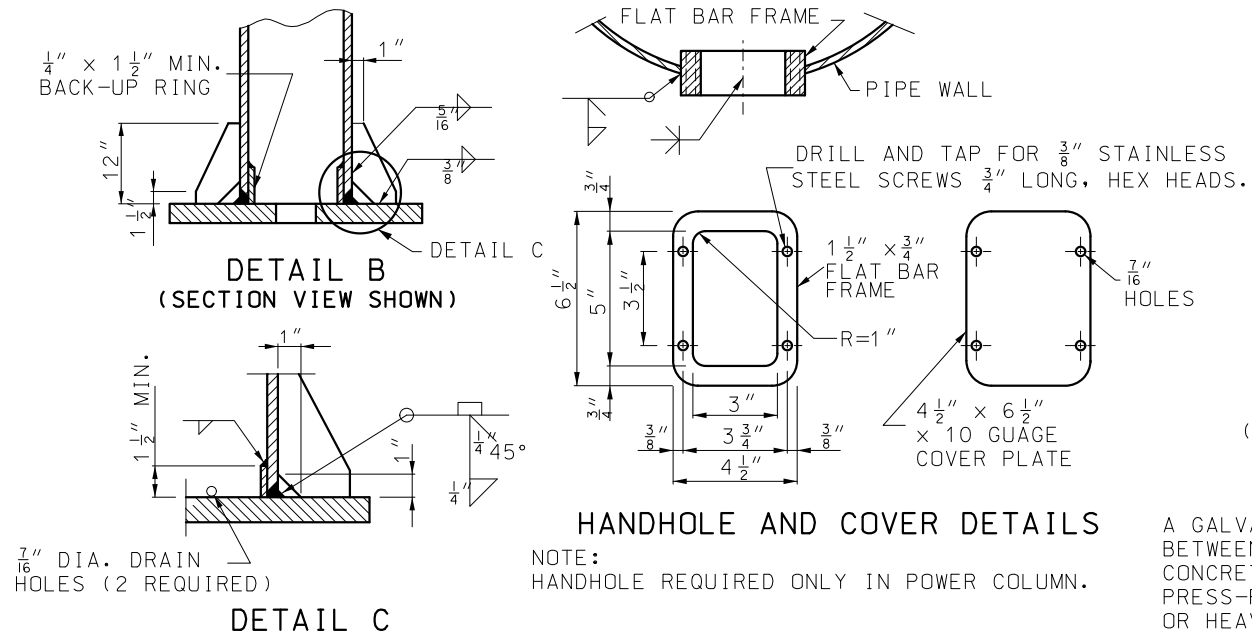
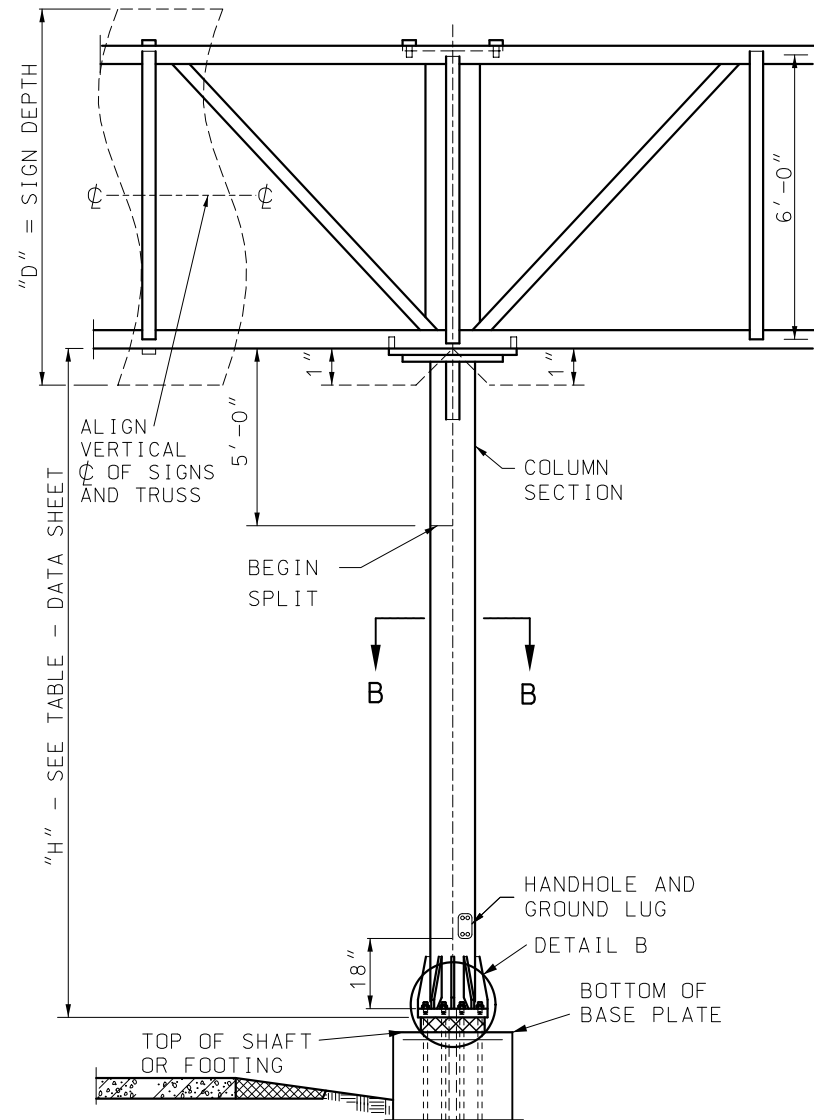
NOTE:  $\frac{3}{4}''$  DIA. BOLTS SHALL BE REMOVED AFTER WELDING IS COMPLETE. BOLT HOLES SHALL BE PLUGGED AND THE OUTSIDE FACE GROUND SMOOTH.

NOTE A: SPLICING CHORD ANGLES IN THE SHOP AND THE FIELD SPLICE SHOWN IN THIS SHEET WILL NOT BE ALLOWED WITHOUT SPECIAL PERMISSION. IF PERMISSION IS GRANTED SUCH SPLICES SHALL BE LOCATED AT THE CENTER LINE OF MAIN PANEL POINT NEXT TO COLUMN.

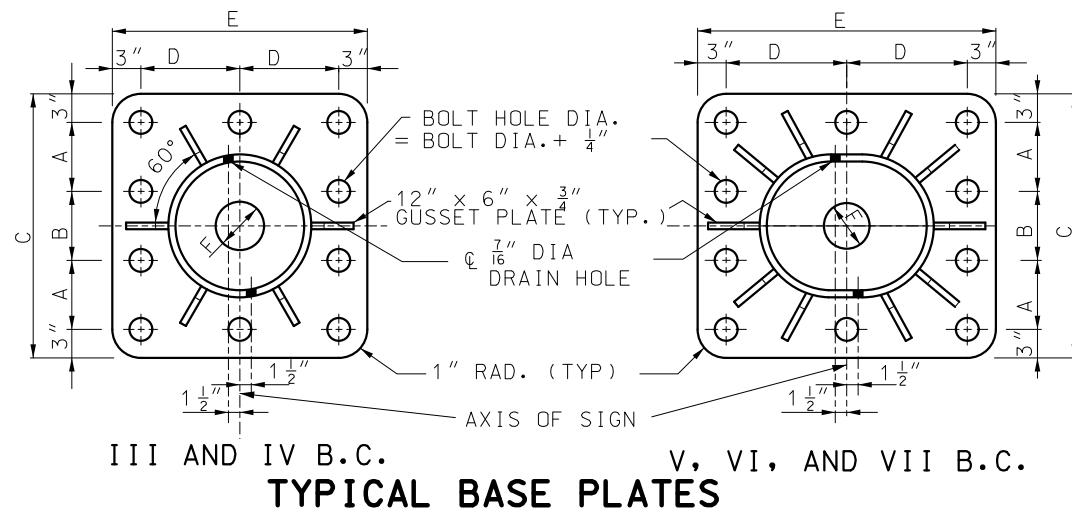


|                                                                                                                                            |                                                                            |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------|
| <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                                            |                 |
|                                                                                                                                            | <b>OVERHEAD SIGN TRUSSES</b><br>BUTTERFLY & CANTILEVER<br>STRUCTURAL STEEL |                 |
|                                                                                                                                            | DATE EFFECTIVE: 01-01-2021<br>DATE PREPARED: 10/14/2020                    | <b>903.12AA</b> |

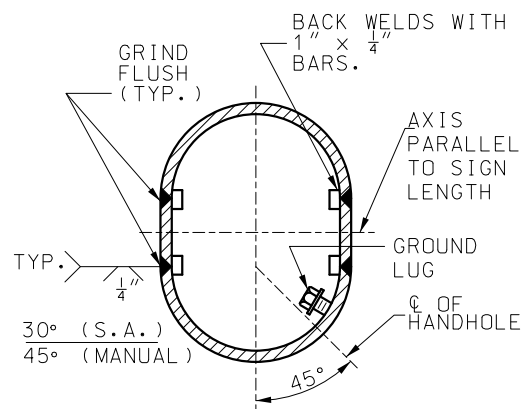
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



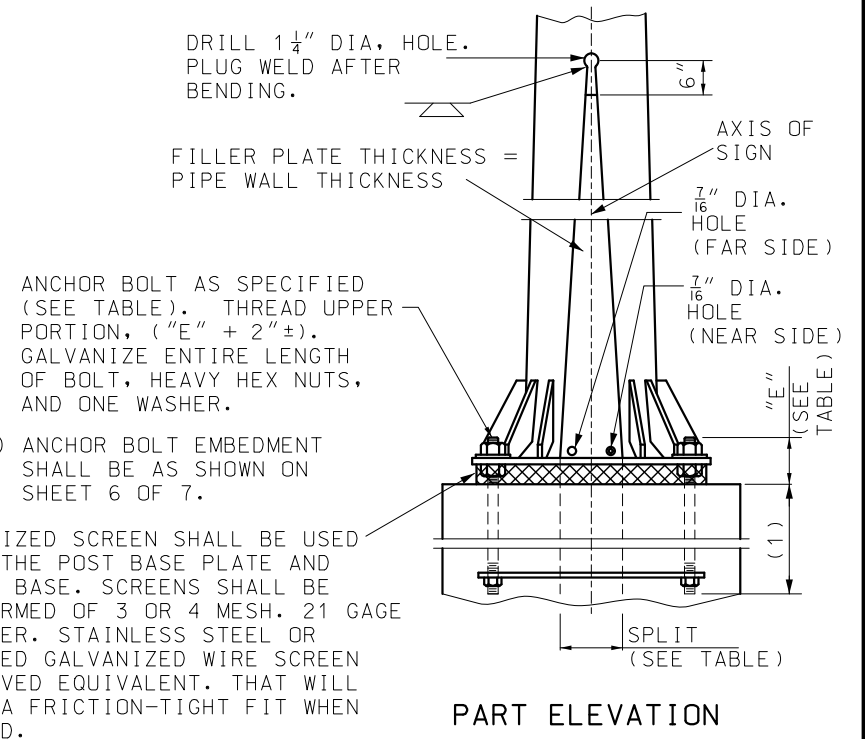
(BOTH DETAILS ARE SHOWN FOR 4 BOLTS - SIMILAR FOR 3 BOLTS)  
 \* DIMENSION SHOWN FOR DRILLED SHAFT OPTION. FOR SPREAD FOOTING OPTION REFER TO SHEET 6 OF 7.



| TYPICAL BASE PLATE<br>(10 ANCHOR TYPE)<br>BUTTERFLY AND CANTILEVER (B.C.) |     |     |         |     |         |
|---------------------------------------------------------------------------|-----|-----|---------|-----|---------|
|                                                                           | III | IV  | V       | VI  | VII     |
| A                                                                         | 8"  | 9"  | 8"      | 9"  | 10 1/2" |
| B                                                                         | 10" | 10" | 10"     | 10" | 11"     |
| C                                                                         | 32" | 34" | 32"     | 34" | 38"     |
| D                                                                         | 13" | 14" | 16 1/2" | 18" | 20"     |
| E                                                                         | 32" | 34" | 39"     | 42" | 46"     |
| F                                                                         | 6"  | 6"  | 6"      | 6"  | 6"      |



NOTE:  
 FOR DETAILS OF OPTIONAL SUBSTRUCTURES,  
 SEE OTHER SHEETS.  
 ANCHOR BOLTS AND PLATE NOT SHOWN.



#### GENERAL NOTES:

SUBSTRUCTURE SHALL BE BACKFILLED PRIOR TO ERECTION OF POST.

ASTM A 106 GRADE B STEEL PIPE OR A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE; ASTM SPECIFICATION A53.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

A HORIZONTAL WELDED SPLICE MAY BE FABRICATED IN THE COLUMN BETWEEN THE TOP OF PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

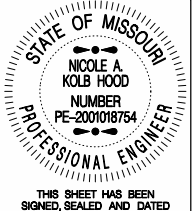
ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL C OF THE TRUSS.



**MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION**

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

**OVERHEAD SIGN TRUSS  
COLUMN AND BASE PLATES**



THIS SHEET HAS BEEN  
SIGNED, SEALED AND DATED  
ELECTRONICALLY.

**903.12AA**

SHEET NO.  
**3 OF 7**

DATE EFFECTIVE: 01-01-2021  
DATE PREPARED: 10/14/2020

| DRILLED SHAFT OPTION |             |               |      |       |                      |             |      |        |       |        |       |       |        |                      |         |          |         |         |         |                     |      |          |         |                    |                     |                    |        | ALTERNATE PEDESTALS |        |  |  |
|----------------------|-------------|---------------|------|-------|----------------------|-------------|------|--------|-------|--------|-------|-------|--------|----------------------|---------|----------|---------|---------|---------|---------------------|------|----------|---------|--------------------|---------------------|--------------------|--------|---------------------|--------|--|--|
| POST TYPE            | PIPE COLUMN |               | "E " | SPLIT | BASE PLATE SIZE**    | ANCHOR BOLT |      | C      | FA    | FB     | FC    | FD    | FH     | COLLAR REINFORCEMENT |         |          |         |         |         | SHAFT REINFORCEMENT |      |          |         | REBAR TOTAL (LBS.) | CON-CRETE (CU.YDS.) | REBAR TOTAL (LBS.) |        | CONCRETE (CU.YDS.)  |        |  |  |
|                      | O.D.        | WEIGHT (LBS.) |      |       |                      | NO.         | DIA. |        |       |        |       |       |        | MOMENT-C1            |         | SHEAR-C2 |         | SKIN-C3 |         | LONGITUDINAL S1     |      | SHEAR-S2 |         |                    |                     | TYPE A             | TYPE C | TYPE A              | TYPE C |  |  |
|                      |             |               |      |       |                      |             |      |        |       |        |       |       |        | BARS                 | SPACING | BARS     | SPACING | BARS    | SPACING | QUANTITY            | BARS | BARS     | SPACING |                    |                     |                    |        |                     |        |  |  |
| III                  | 18"         | 93.45         | 8½"  | 0"    | 2'-8" x 2'-8" x 1¾"  | 10          | 2"   | 2'-10" | 4'-0" | 7'-6"  | 1'-6" | 4'-6" | 14'-0" | #6                   | 6"      | #4       | 12"     | #4      | 12"     | 19                  | #10  | #5       | 6"      | 2126               | 12.4                | 2066               | 2077   | 13.4                | 14.5   |  |  |
| IV                   | 20"         | 104.13        | 8½"  | 0"    | 2'-10" x 2'-10" x 2" | 10          | 2¼"  | 3'-0"  | 4'-0" | 7'-6"  | 1'-6" | 4'-6" | 14'-0" | #6                   | 6"      | #4       | 12"     | #4      | 12"     | 19                  | #10  | #5       | 6"      | 2126               | 12.4                | 2066               | 2077   | 13.5                | 14.6   |  |  |
| V                    | 18"         | 93.45         | 8½"  | 7"    | 3'-3" x 2'-8" x 2"   | 10          | 2¼"  | 2'-10" | 5'-0" | 13'-6" | 4'-0" | 5'-6" | 17'-0" | #6                   | 6"      | #4       | 12"     | #4      | 12"     | 22                  | #11  | #6       | 6"      | 3901               | 26.5                | 3763               | 3782   | 28.8                | 30.7   |  |  |
| VI                   | 20"         | 104.13        | 8½"  | 8"    | 3'-6' x 2'-10" x 2¼" | 10          | 2¼"  | 3'-0"  | 5'-0" | 14'-0" | 4'-0" | 6'-0" | 18'-0" | #6                   | 6"      | #4       | 12"     | #4      | 12"     | 27                  | #11  | #6       | 6"      | 4742               | 31.8                | 4528               | 4547   | 34.1                | 36.2   |  |  |
| VII                  | 24"         | 125.49        | 9"   | 8"    | 3'-10" x 3'-2" x 2¼" | 10          | 2½"  | 3'-4"  | 5'-0" | 14'-0" | 4'-0" | 6'-0" | 18'-0" | #6                   | 6"      | #4       | 12"     | #4      | 12"     | 27                  | #11  | #6       | 6"      | 4742               | 31.8                | 4528               | 4547   | 34.5                | 36.8   |  |  |

| SPREAD FOOTING OPTION |             |               |        |       |                         |             |        |                 |        |                 |                                    |      |        |      |                        |      |     |      |                    |                     |  |
|-----------------------|-------------|---------------|--------|-------|-------------------------|-------------|--------|-----------------|--------|-----------------|------------------------------------|------|--------|------|------------------------|------|-----|------|--------------------|---------------------|--|
| POST TYPE             | PIPE COLUMN |               | "E "   | SPLIT | BASE PLATE SIZE**       | ANCHOR BOLT |        | PEDESTAL SIZE * |        | FOOTING SIZE *  | LONGITUDINAL FOOTING REINFORCEMENT |      |        |      | PEDESTAL REINFORCEMENT |      |     |      | REBAR TOTAL (LBS.) | CON-CRETE (CU.YDS.) |  |
|                       | O.D.        | WEIGHT (LBS.) |        |       |                         | NO.         | DIA.   | a               | b      |                 | TOP                                |      | BOTTOM |      |                        |      |     |      |                    |                     |  |
|                       |             |               |        |       |                         |             |        |                 |        |                 | NO.                                | BARS | NO.    | BARS | NO.                    | BARS | NO. | BARS |                    |                     |  |
| III                   | 18"         | 93.45         | 8 1/2" | 0"    | 2'-8" x 2'-8" x 1 3/4"  | 10          | 2"     | 4'-2"           | 3'-8"  | 10'-0" x 13'-0" | 10                                 | #5   | 10     | #5   | 10                     | #4   | 14  | #8   | 695                | 14.4                |  |
| IV                    | 20"         | 104.13        | 8 1/2" | 0"    | 2'-10" x 2'-10" x 2"    | 10          | 2 1/4" | 4'-4"           | 3'-10" | 10'-0' x 14'-0" | 10                                 | #5   | 10     | #5   | 10                     | #4   | 14  | #8   | 733                | 15.6                |  |
| V                     | 18"         | 93.45         | 8 1/2" | 7"    | 3'-3" x 2'-8" x 2"      | 10          | 2 1/4" | 4'-9"           | 3'-8"  | 9'-0" x 17'-0"  | 9                                  | #5   | 10     | #7   | 10                     | #4   | 14  | #8   | 955                | 16.5                |  |
| VI                    | 20"         | 104.13        | 8 1/2" | 8"    | 3'-6' x 2'-10" x 2 1/4" | 10          | 2 1/4" | 5'-0"           | 3'-10" | 9'-0" x 19'-0"  | 9                                  | #5   | 10     | #7   | 10                     | #4   | 14  | #8   | 1028               | 18.4                |  |
| VII                   | 24"         | 125.49        | 9"     | 8"    | 3'-10" x 3'-2" x 2 1/4" | 10          | 2 1/2" | 5'-4"           | 4'-2"  | 10'-0" x 20'-0" | 9                                  | #5   | 12     | #7   | 10                     | #4   | 14  | #8   | 1196               | 21.5                |  |

| SPREAD FOOTING OPTION WITH ALTERNATE PEDESTALS |             |               |      |       |                      |             |      |                 |        |     |                 |                                           |      |        |      |                               |      |     |      |                           |                           |                                           |      |     |      |                               |      |     |      |                           |                           |     |      |     |      |
|------------------------------------------------|-------------|---------------|------|-------|----------------------|-------------|------|-----------------|--------|-----|-----------------|-------------------------------------------|------|--------|------|-------------------------------|------|-----|------|---------------------------|---------------------------|-------------------------------------------|------|-----|------|-------------------------------|------|-----|------|---------------------------|---------------------------|-----|------|-----|------|
| POST TYPE                                      | PIPE COLUMN |               | "E " | SPLIT | BASE PLATE SIZE**    | ANCHOR BOLT |      | PEDESTAL SIZE * |        |     | FOOTING SIZE *  | TYPE A LONGITUDINAL FOOTING REINFORCEMENT |      |        |      | TYPE A PEDESTAL REINFORCEMENT |      |     |      | TYPE A REBAR TOTAL (LBS.) | TYPE A CONCRETE (CU.YDS.) | TYPE C LONGITUDINAL FOOTING REINFORCEMENT |      |     |      | TYPE C PEDESTAL REINFORCEMENT |      |     |      | TYPE C REBAR TOTAL (LBS.) | TYPE C CONCRETE (CU.YDS.) |     |      |     |      |
|                                                | O.D.        | WEIGHT (LBS.) |      |       |                      | NO.         | DIA. | c               | d      | e   |                 | TOP                                       |      | BOTTOM |      | NO.                           | BARS | NO. | BARS |                           |                           | NO.                                       | BARS | NO. | BARS | NO.                           | BARS | NO. | BARS |                           |                           | NO. | BARS | NO. | BARS |
|                                                |             |               |      |       |                      |             |      |                 |        |     |                 | NO.                                       | BARS | NO.    | BARS |                               |      |     |      |                           |                           |                                           |      |     |      |                               |      |     |      |                           |                           |     |      |     |      |
| III                                            | 18"         | 93.45         | 8½"  | 0"    | 2'-8" x 2'-8" x 1¾"  | 10          | 2"   | 2'-10"          | 6'-6"  | 15" | 10'-0" x 13'-0" | 10                                        | #5   | 10     | #5   | 10                            | #4   | 14  | #8   | 757                       | 14.4                      | 10                                        | #4   | 10  | #5   | 12                            | #4   | 14  | #8   | 800                       | 15.3                      |     |      |     |      |
| IV                                             | 20"         | 104.13        | 8½"  | 0"    | 2'-10" x 2'-10" x 2" | 10          | 2¼"  | 3'-0"           | 6'-9"  | 18" | 10'-0' x 14'-0" | 10                                        | #5   | 10     | #5   | 10                            | #4   | 14  | #8   | 795                       | 15.6                      | 10                                        | #4   | 10  | #5   | 12                            | #4   | 14  | #8   | 839                       | 16.5                      |     |      |     |      |
| V                                              | 18"         | 93.45         | 8½"  | 7"    | 3'-3" x 2'-8" x 2"   | 10          | 2¼"  | 2'-10"          | 7'-0"  | 12" | 9'-0" x 17'-0"  | 9                                         | #5   | 10     | #7   | 10                            | #4   | 14  | #8   | 1015                      | 16.5                      | 10                                        | #4   | 10  | #7   | 12                            | #4   | 14  | #8   | 1059                      | 17.5                      |     |      |     |      |
| VI                                             | 20"         | 104.13        | 8½"  | 8"    | 3'-6' x 2'-10" x 2¼" | 10          | 2¼"  | 3'-0"           | 7'-6"  | 15" | 9'-0" x 19'-0"  | 9                                         | #5   | 10     | #7   | 10                            | #4   | 14  | #8   | 1099                      | 18.4                      | 10                                        | #4   | 10  | #7   | 12                            | #4   | 14  | #8   | 1134                      | 19.5                      |     |      |     |      |
| VII                                            | 24"         | 125.49        | 9"   | 8"    | 3'-10" x 3'-2" x 2¼" | 10          | 2½"  | 3'-4"           | 7'-10" | 15" | 10'-0" x 20'-0" | 9                                         | #5   | 12     | #7   | 10                            | #4   | 14  | #8   | 1257                      | 21.5                      | 10                                        | #4   | 12  | #7   | 12                            | #4   | 14  | #8   | 1302                      | 22.6                      |     |      |     |      |

\* BASE PLATES, PEDESTAL AND FOOTINGS, LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.  
\*\* BASE PLATES, PEDESTAL AND FOUNDATIONS, LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.



MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL  
JEFFERSON CITY, MO 65102  
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI

NICOLE A. KOLB HOOD

NUMBER PE-2001018764

PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE EFFECTIVE: 01-01-2021

DATE PREPARED: 10/14/2020

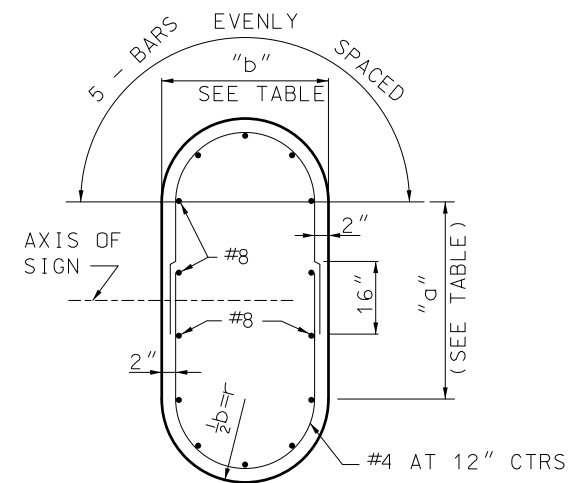
903.12AA

SHEET NO. 4 OF 7

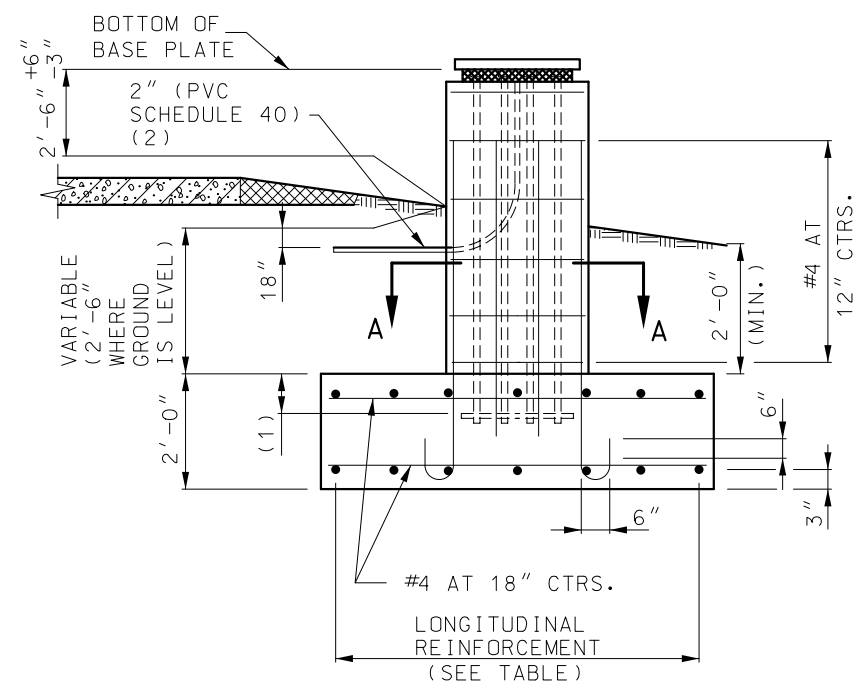
OVERHEAD SIGN TRUSSES  
OPTIONAL SUBSTRUCTURE DATA

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



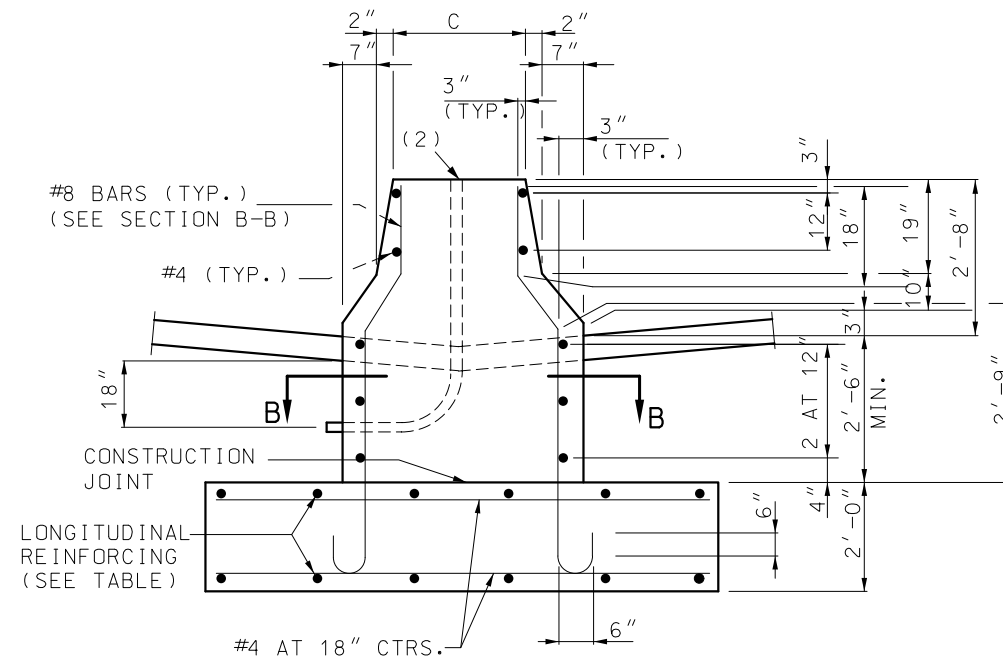


SECTION A-A  
(TYPICAL SECTION SHOWING REINFORCING STEEL)

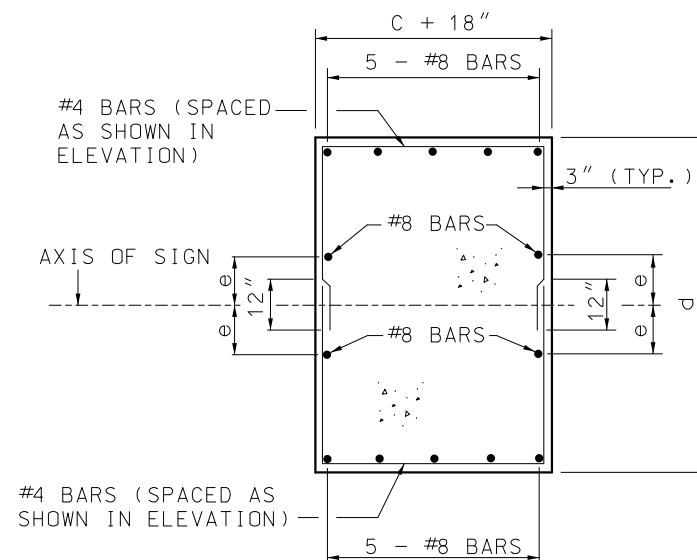


ELEVATION

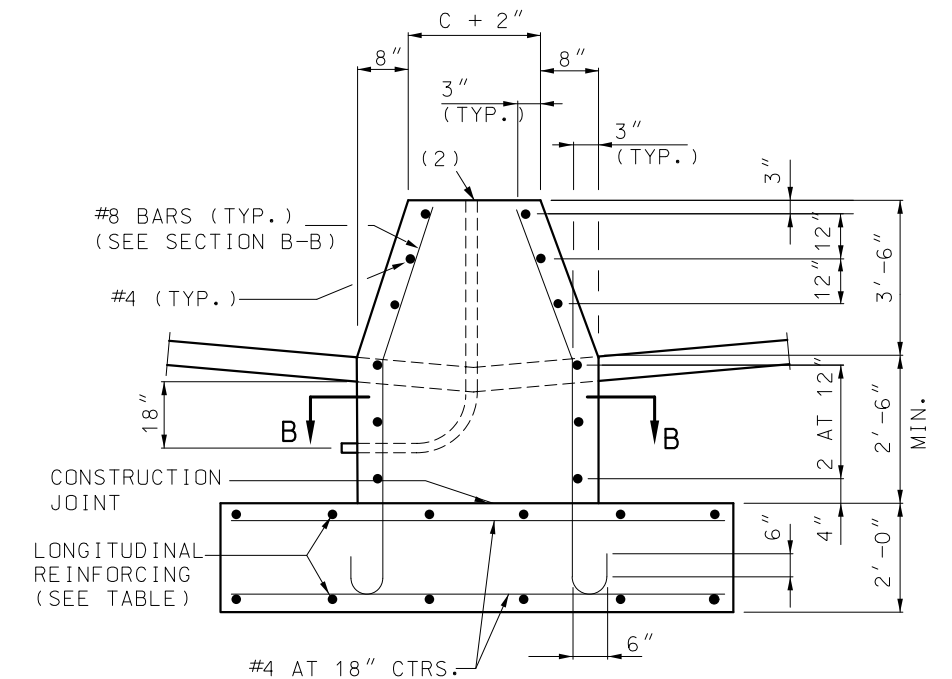
- (1) 12"  $\pm \frac{6}{3}$ " (DETAIL FOR 12" FIELD TOLERANCE)
- (2) 2" CONDUIT IN THE CONCRETE PEDESTAL SHALL BE PVC SCHEDULE 40 AND SHALL BE PLACED WITH A MINIMUM BEND RADIUS OF  $9\frac{1}{2}$ ".



PART ELEVATION  
(TYPE A CONCRETE TRAFFIC BARRIER)



SECTION B-B  
TYPICAL SECTION SHOWING  
REINFORCING STEEL  
DETAILS OF ALTERNATE PEDESTAL



PART ELEVATION  
(TYPE C CONCRETE TRAFFIC BARRIER)

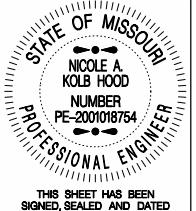
#### GENERAL NOTES:

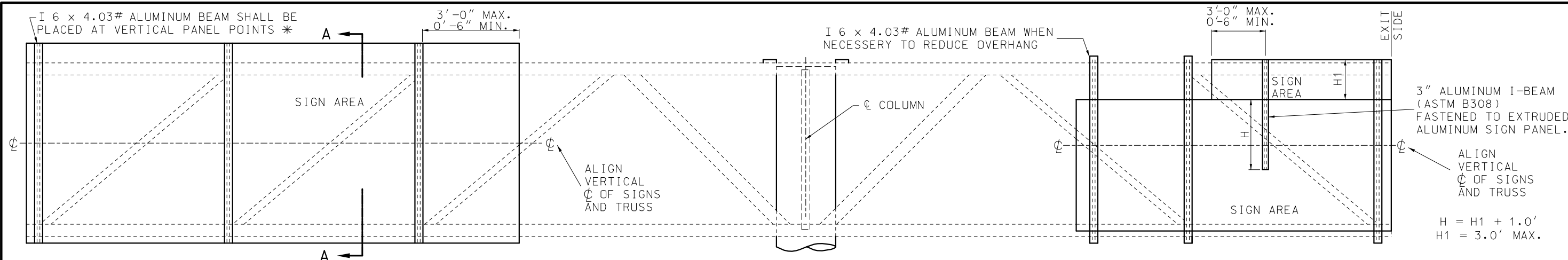
PEDESTAL AND FOOTING SHALL BE CLASS B (P.C.C.).

MINIMUM CLEARANCE TO REINFORCEMENT IS 3" EXCEPT AS SHOWN.

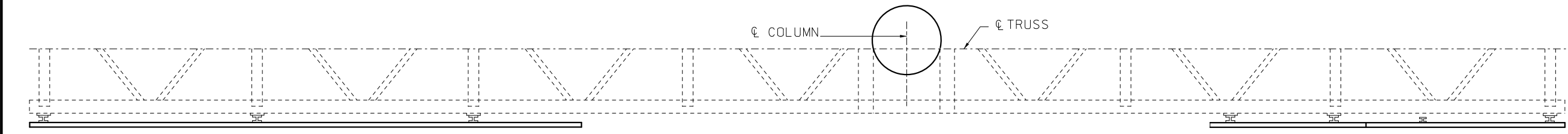
CONTACT THE ENGINEER IF WATER TABLE IS ENCOUNTERED DURING EXCAVATION.

PIPE COLUMN, BASE PLATE, ANCHOR BOLTS AND NOTES PERTAINING TO THESE ITEMS HAVE BEEN OMITTED FOR CLARITY. REFER TO SHEET 3 OF 7 FOR DETAILS OF THESE ITEMS.

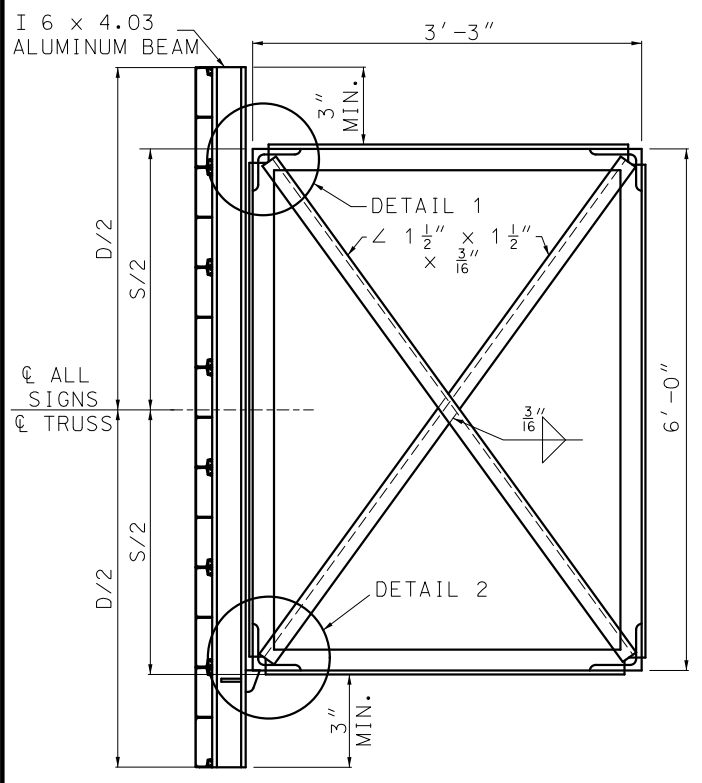
|                                                                                                                                                                                                                                  |                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
|  <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                                                       |
|                                                                                                                                             | <b>OVERHEAD SIGN TRUSSES</b><br><b>SPREAD FOOTING</b> |
| DATE EFFECTIVE: 01-01-2021<br>DATE PREPARED: 10/14/2020                                                                                                                                                                          | <b>903.12AA</b><br>SHEET NO. 6 OF 7                   |



TYPICAL ELEVATION OF SIGNS COMPONENTS



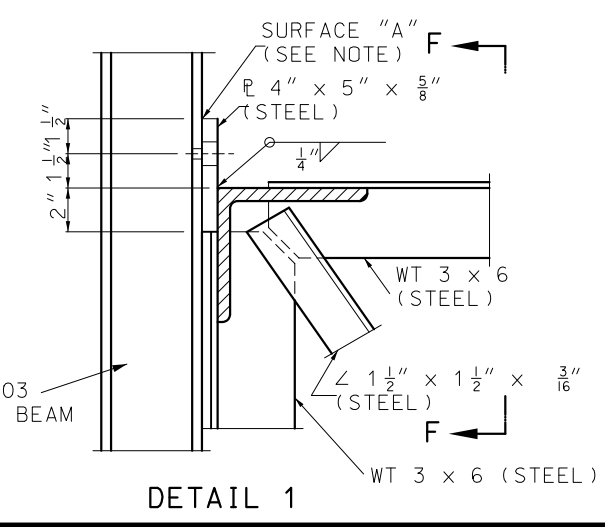
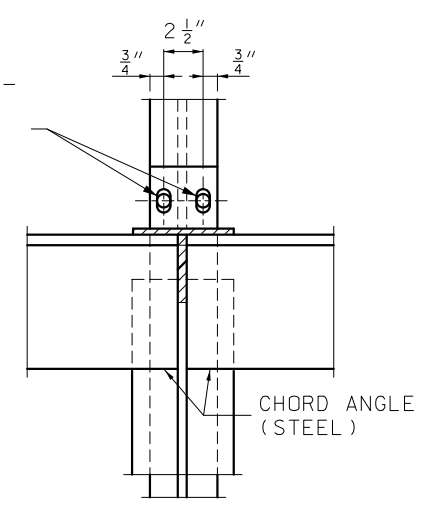
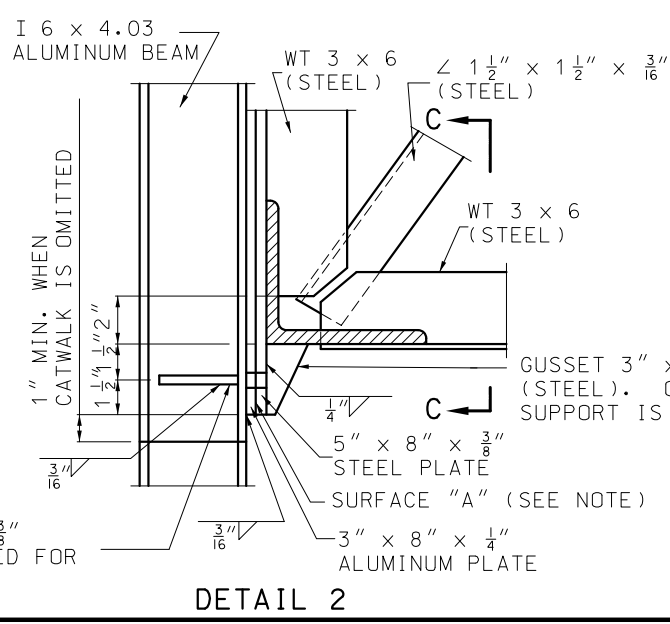
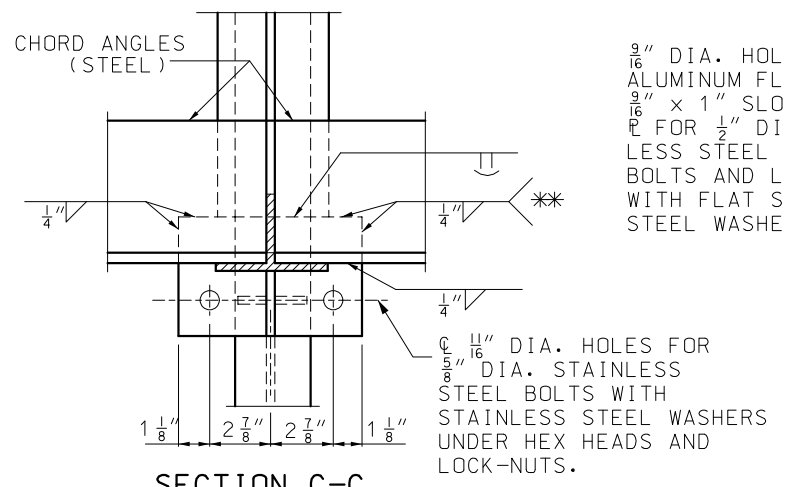
TYPICAL PLAN OF SIGN COMPONENTS



SECTION A-A  
TYPICAL SECTION  
OF SIGN SUPPORT

NOTE:  
"D" = GREATEST OVERALL DEPTH  
OF ANY SIGNS ON TRUSSES.

TWO - GUSSETS 5" x 1" x  $\frac{3}{8}"$   
(ALUM.) OMIT WHEN NOT USED FOR  
CATWALK SUPPORT.



NOTE:  
SURFACE "A", ZINC CHROMATE ON ALUMINUM SURFACES.  
NORMAL CLEANING AND PAINTING ON STEEL SURFACES.  
ZINC CHROMATE IS NOT REQUIRED WHEN STEEL IS GALVANIZED.

\* FOR SIGN HEIGHTS GREATER THAN 17'-0", BUT LESS THAN OR EQUAL TO 20'-0" USE ADDITIONAL I 6 x 4.03 ALUMINUM BEAMS TO ACHIEVE A MAXIMUM SPACING OF 4'-0" BETWEEN SIGN SUPPORTS.

\*\* WHEN SIGN SUPPORTS ARE PLACED BETWEEN VERTICAL PANEL POINTS AS ILLUSTRATED IN TYPICAL ELEVATION OF SIGNS COMPONENTS, WELD THE  $\frac{3}{8}"$  STEEL PLATE TO THE BOTTOM CHORD WITH A  $\frac{1}{4}"$  FILLET WELD.

GENERAL NOTES:

EXIT NO. PANELS SHALL BE MONTED FLUSH WITH THE EXIT SIDE OF THE GUIDE SIGN.

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL  $\phi$  OF THE TRUSS.

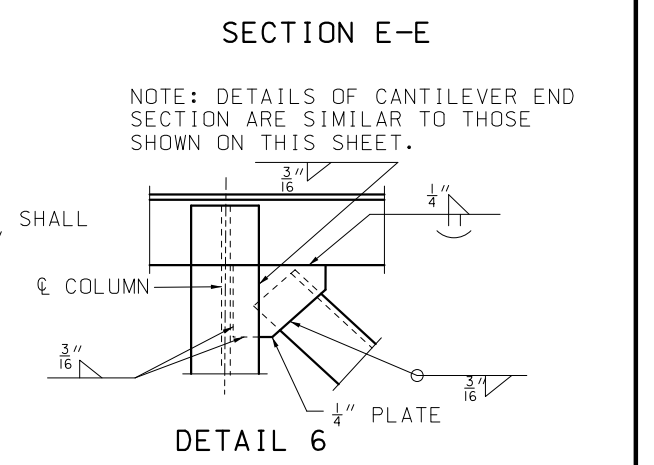
FOR SIGN MOUNTING DETAILS, SEE STANDARD PLANS 903.03.

|                                                                                                                                                         |                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p> <p>105 WEST CAPITOL<br/>JEFFERSON CITY, MO 65102<br/>1-888-ASK-MODOT (1-888-275-6636)</p> |                                                                                          |
|                                                                                                                                                         | <p><b>OVERHEAD SIGN TRUSSES</b></p> <p>STRUCTURAL STEEL<br/>BUTTERFLY AND CANTILEVER</p> |
| <p>DATE EFFECTIVE: 01-01-2021</p> <p>DATE PREPARED: 10/14/2020</p>                                                                                      | <p><b>903.12AA</b></p>                                                                   |
| <p>SHEET NO. 7 OF 7</p>                                                                                                                                 |                                                                                          |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



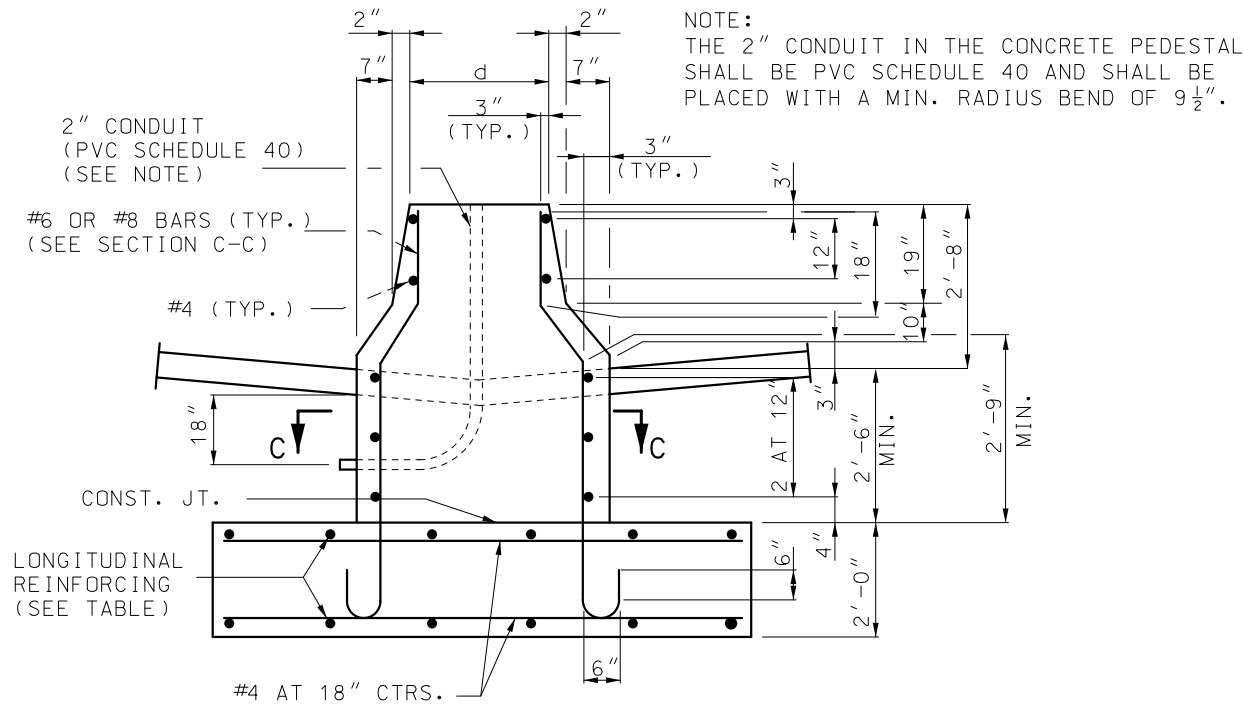




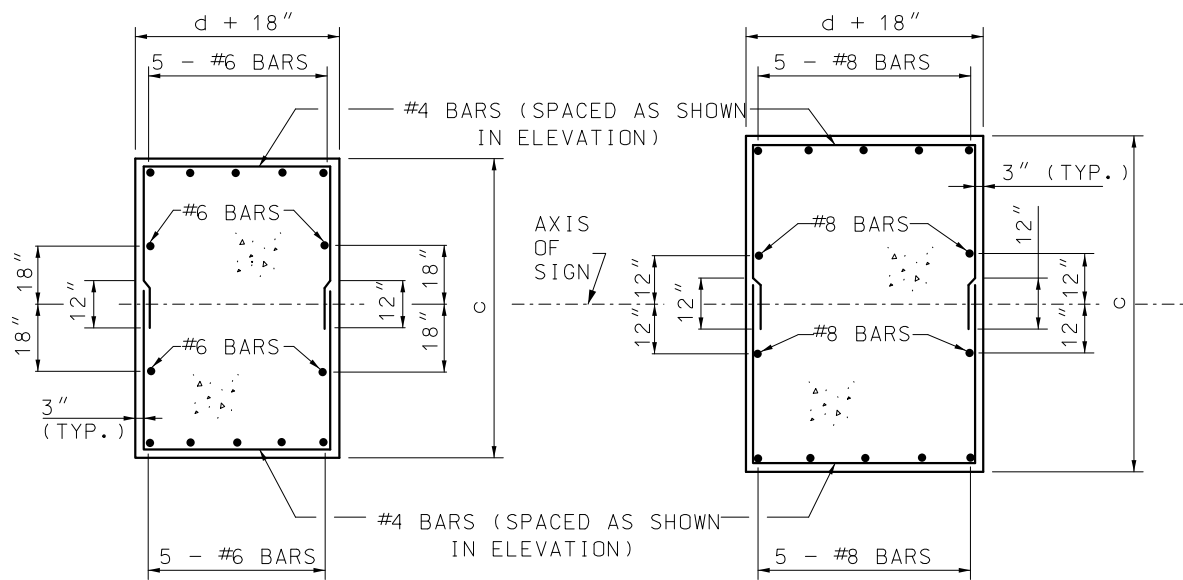
FILLET WELD 1 SHALL BE  $\frac{5}{16}$ " WHEN "t" IS  $\frac{1}{2}$ " OR LESS  
AND  $\frac{1}{4}$ " WHEN "t" IS GREATER THAN  $\frac{1}{2}$ ".

|                                                                                       |  |                                                                                                                                                                                                                                                                                         |  |
|---------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION<br/>COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636)                                                                                                                                          |  |
|  |  | <h1 style="text-align: center;">OVERHEAD SIGN TRUSSES</h1> <h2 style="text-align: center;">STRUCTURAL STEEL</h2>                                                                                                                                                                        |  |
| DATE EFFECTIVE: <u>01/01/2021</u><br>DATE PREPARED: <u>10/14/2020</u>                 |  | <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="font-size: 2em; font-weight: bold;">903.60AC</div> <div style="text-align: right;">             SHEET NO.<br/> <div style="font-size: 2em; font-weight: bold;">2 OF 5</div> </div> </div> |  |





PART ELEVATION  
(TYPE A CONCRETE TRAFFIC BARRIER)



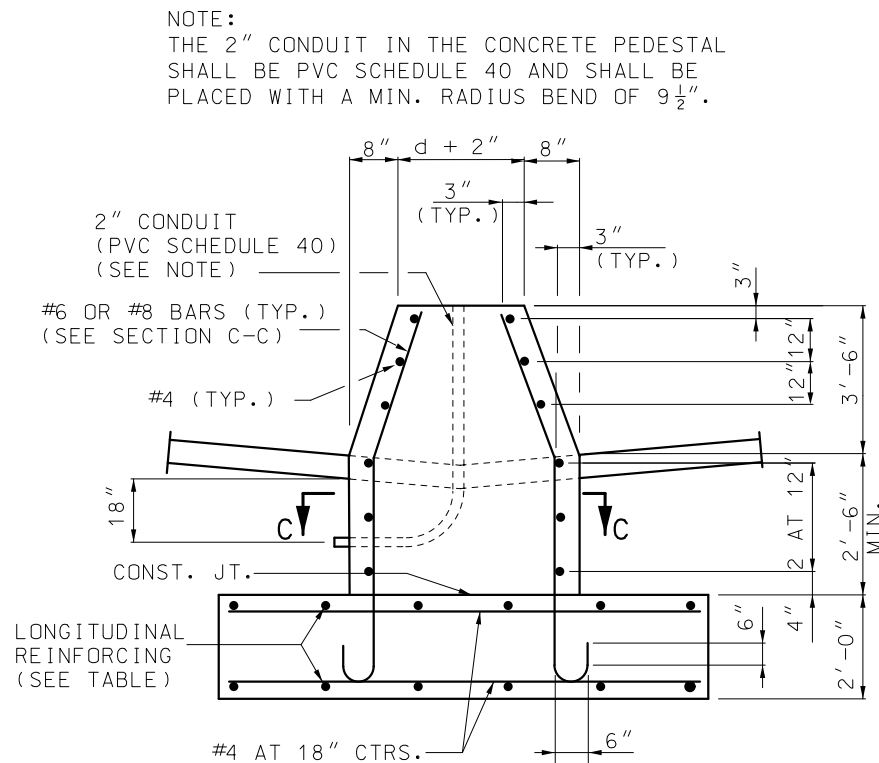
POST TYPE I AND II

POST TYPE III, IV,  
V, VI, AND VII

SECTION C-C  
TYPICAL SECTION SHOWING  
REINFORCING STEEL

## DETAILS OF ALTERNATE PEDESTAL

(TO BE USED ADJACENT TO TYPE "A" OR "C" MEDIAN BARRIER)



PART ELEVATION  
(TYPE C CONCRETE TRAFFIC BARRIER)

| POST TYPE | PIPE COLUMN        | PEDESTAL SIZE* |        | FOOTING SIZE*  | LONGITUDINAL FOOTING REINFORCEMENT |            | CONCRETE C.Y.         |                       |
|-----------|--------------------|----------------|--------|----------------|------------------------------------|------------|-----------------------|-----------------------|
|           |                    | c              | d      |                | TOP                                | BOTTOM     | TYPE A MEDIAN BARRIER | TYPE C MEDIAN BARRIER |
| I         | 12" STD. AT 65.42  | 5'-9"          | 2'-1"  | 7'-0"x 14'-6"  | 7-#5 BARS                          | 7-#6 BARS  | 10.9                  | 11.6                  |
| II        | 14" O.D. AT 72.09  | 6'-2"          | 2'-2"  | 8'-0"x 16'-0"  | 8-#5 BARS                          | 9-#6 BARS  | 13.2                  | 14.0                  |
| III       | 16" O.D. AT 82.77  | 6'-7"          | 2'-4"  | 8'-6"x 17'-6"  | 9-#5 BARS                          | 9-#7 BARS  | 15.2                  | 16.1                  |
| IV        | 18" O.D. AT 93.45  | 7'-1"          | 2'-6"  | 9'-6"x 19'-0"  | 10-#5 BARS                         | 10-#8 BARS | 18.1                  | 19.1                  |
| V         | 20" O.D. AT 104.13 | 7'-8"          | 2'-11" | 10'-0"x 20'-0" | 10-#5 BARS                         | 10-#8 BARS | 20.6                  | 21.7                  |
| VI        | 24" O.D. AT 125.49 | 8'-3"          | 3'-5"  | 10'-6"x 21'-0" | 11-#5 BARS                         | 11-#8 BARS | 23.3                  | 24.6                  |
| VII       | 24" O.D. AT 125.49 | 8'-6"          | 3'-5"  | 11'-0"x 22'-0" | 11-#5 BARS                         | 11-#9 BARS | 25.1                  | 26.5                  |

\* BASE PLATES, PEDESTAL, AND FOOTINGS LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.

### GENERAL NOTES:

A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE; ASTM SPECIFICATION A53.

NO OBJECTIONABLE SEAMS WILL BE PERMITTED.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

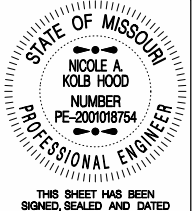
PIPE COLUMN, BASE PLATE, ANCHOR BOLTS AND NOTES PERTAINING TO THESE ITEMS HAVE BEEN OMITTED FOR CLARITY. REFER TO SHEET 3 OF 5 FOR DETAILS OF THESE ITEMS.

GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

QUANTITIES FOR PEDESTAL ARE BASED ON NOMINAL HEIGHT OF 5'-2" (TYPE A MEDIAN BARRIER) OR 6'-0" (TYPE C MEDIAN BARRIER).

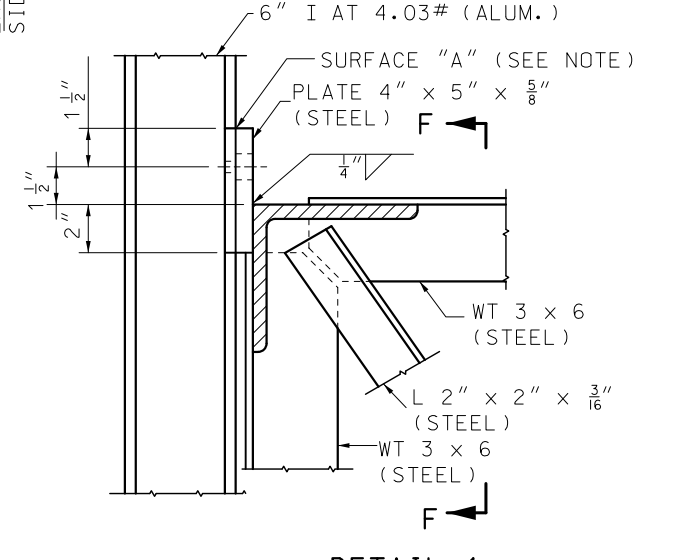
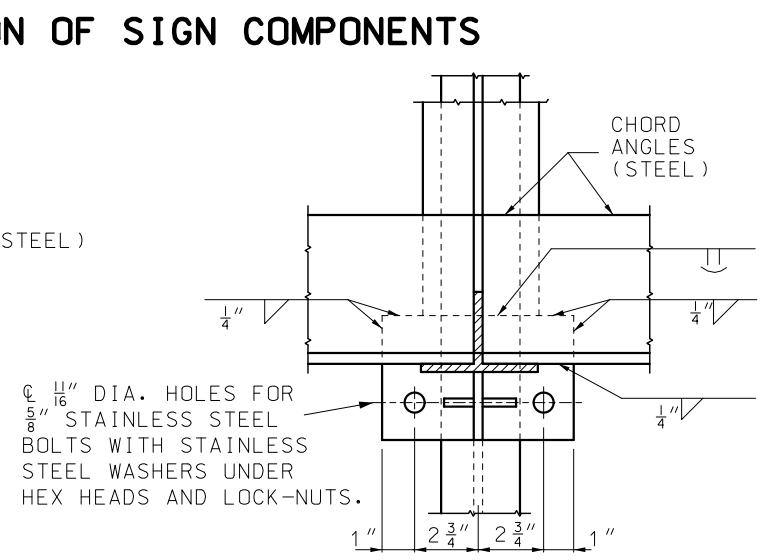
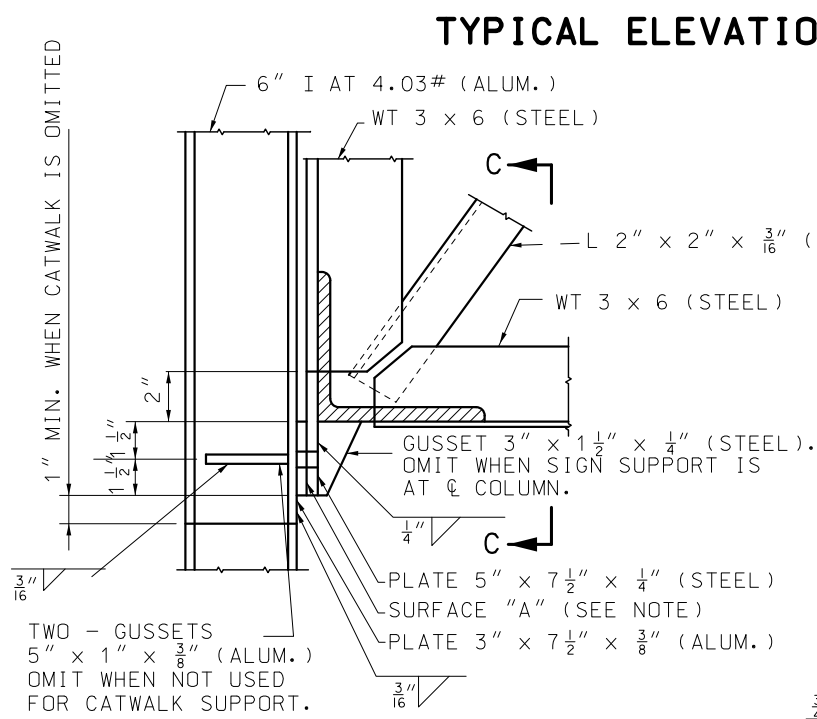
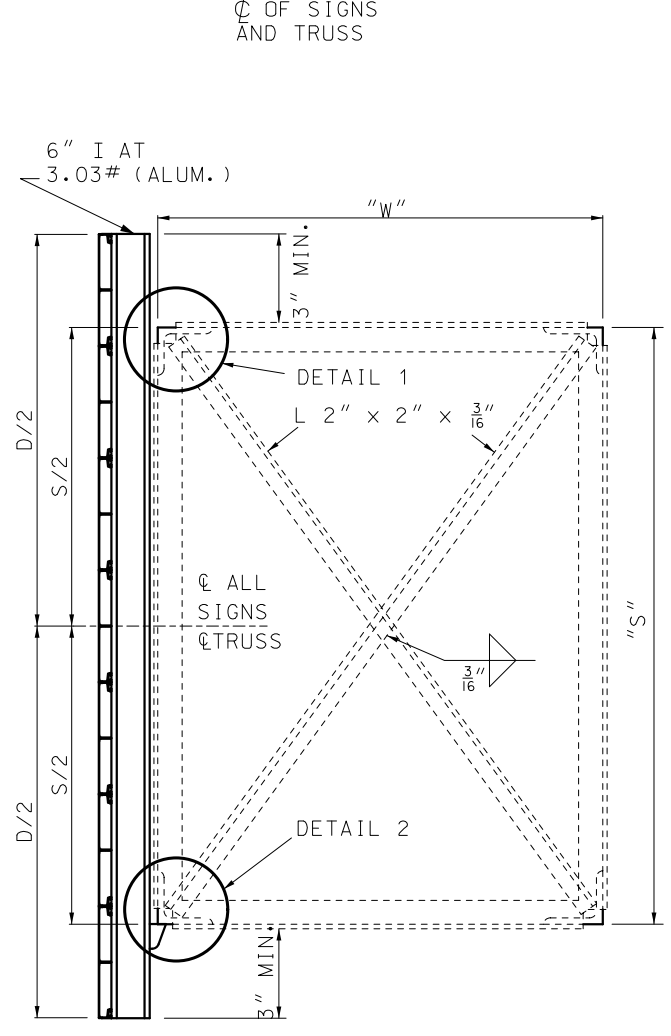
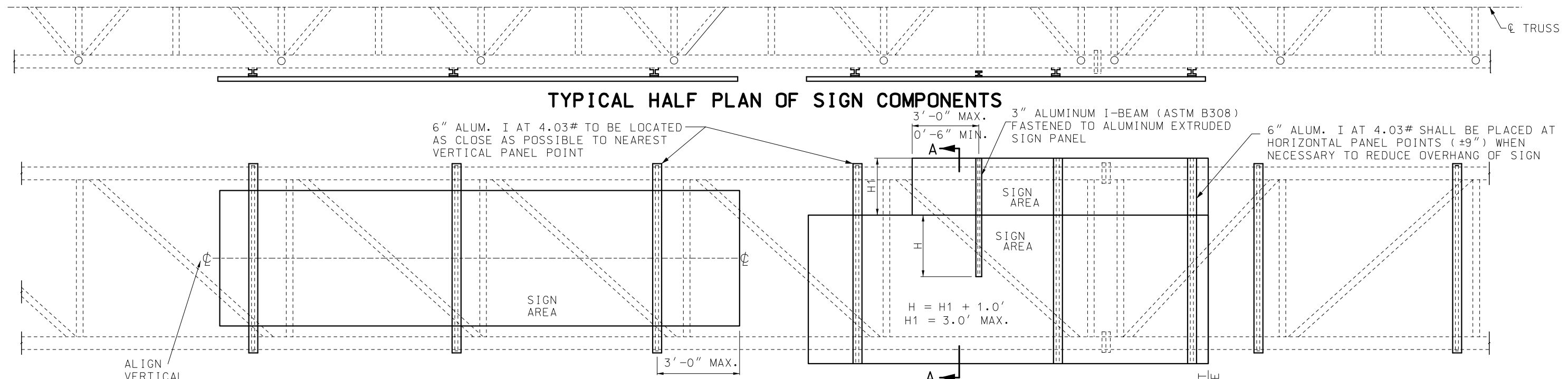
QUANTITIES FOR FOOTING ARE BASED ON NOMINAL DEPTH OF 2'-0".

QUANTITIES SHOWN ARE FOR ONE COLUMN ONLY.

|                                                                                       |                                                                                                                                            |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b><br>105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |
|  | <b>OVERHEAD SIGN TRUSSES</b><br>STRUCTURAL STEEL                                                                                           |
| DATE EFFECTIVE: 01/01/2021<br>DATE PREPARED: 10/14/2020                               | <b>903.60AC</b><br>SHEET NO. 4 OF 5                                                                                                        |

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

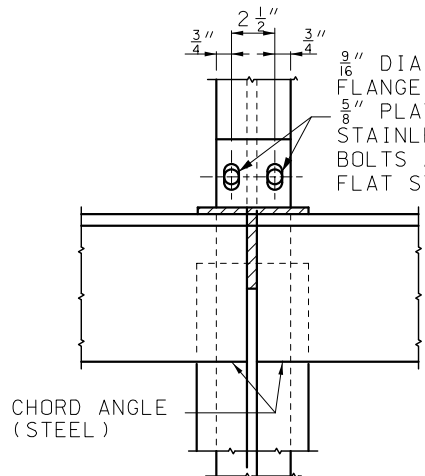
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.



**SECTION A-A**

**TYPICAL SECTION OF SIGN SUPPORT**

NOTE: "D" = GREATEST OVERALL DEPTH OF ANY SIGN OR SIGNS ON TRUSSES AND "S" = TRUSS DEPTH. SEE SHEET NO. 5 OF 7 FOR LOCATION OF SECTION A-A.



NOTE:  
SURFACE "A", ZINC CHROMATE ON ALUMINUM SURFACES.  
NORMAL CLEANING AND PAINTING ON STEEL SURFACES. ZINC CHROMATE IS NOT REQUIRED WHEN STEEL IS GALVANIZED.

GENERAL NOTES:

EXIT NO. PANELS SHALL BE MOUNTED FLUSH WITH THE EXIT SIDE OF THE GUIDE SIGN.

ALL SIGNS SHALL BE CENTERED VERTICALLY ABOUT THE HORIZONTAL C OF THE TRUSS.

|                            |                              |                                                                                  |                  |
|----------------------------|------------------------------|----------------------------------------------------------------------------------|------------------|
|                            |                              | <b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>                           |                  |
|                            |                              | 105 WEST CAPITOL<br>JEFFERSON CITY, MO 65102<br>1-888-ASK-MODOT (1-888-275-6636) |                  |
|                            | <b>OVERHEAD SIGN TRUSSES</b> |                                                                                  |                  |
|                            | STRUCTURAL STEEL             |                                                                                  |                  |
| DATE EFFECTIVE: 01/01/2021 | DATE PREPARED: 10/14/2020    | <b>903.60AC</b>                                                                  | SHEET NO. 5 OF 5 |